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NATIONAL DAIRY COUNCIL®

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October 24, 2003

Food Guide Pyramid Reassessment Team
USDA Center for Nutrition Policy and Promotion
3101 Park Center Drive
Room 1034
Alexandria, VA 22302

FR Doc. 03-22763 Notice of Availability of Proposed Food Guide Pyramid Daily Food Intake Patterns and Technical Support Data and Announcement of Public Comment Period.
68 Federal Register 53536, September 11, 2003

Dear Sir or Madam:

The NATIONAL DAIRY COUNCIL ® (NDC) submits the following comments on the docket referenced above.

NDC is an organization that initiates and administers nutrition research, develops nutrition programs, and provides information on nutrition to health professionals and others concerned about good nutrition. The NDC has been a leader in nutrition research and education since 1915. Through its affiliated Dairy Council units, NDC is recognized throughout the nation as a leader in nutrition research and education.

NDC appreciates the opportunity to provide comments on the Center for Nutrition Policy and Promotion's (CNPP) Proposed Food Guide Pyramid Daily Food Intake Patterns [1]. NDC fully supports the development of a science- and food-based dietary guidance tool to help Americans make daily healthful food choices and recognizes the need to reassess and revise daily food intake patterns in light of recent changes in recommendations for nutrients, such as calcium, and for macronutrients such as fat, carbohydrates, protein and fiber. NDC also supports continuation of the five food groups based on their nutritional similarities, their uses in meals and consumer perceptions of the foods as similar. We believe any tool developed should be based on naturally nutrient rich foods. Equally supportable, more than ever, is USDA's goal that food intake patterns should be based on foods commonly consumed as determined from national food consumption surveys in order to make the recommendations realistic and practical.

NDC commends the CNPP for taking the initiative on this very important and timely, albeit complex, issue of integrating the most recent IOM Dietary Reference Intakes (DRI) and Acceptable Macronutrient Distribution Ranges (AMDR) recommendations into the Food Guide Pyramid (FGP) for a stronger and more actionable dietary guidance tool for Americans.

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In 1999, USDA released an adaptation of the FGP targeted to children ages two to six. This "children's pyramid" was based on the actual eating pattern of young children. As USDA observed, young children have unique food patterns and needs in comparison to older children and adults. NDC supports the continued adaptation of the food guide for young children to help parents and caregivers, as well as the children themselves, learn to build good dietary habits early. CNPP should reassess and update the "children's pyramid" during its reassessment of the daily food patterns for the U.S. population. Research clearly shows that kids are not little adults. As part of this update, NDC believes the age range for the "children's pyramid" should be expanded from ages 2 - 6 to 2 - 8 to correspond more appropriately with the cut points in the IOM DRI lifestage nutritional goals. This is especially true given differences in food preferences among this age group of children, as well as the smaller serving size that is appropriate for actual consumption.

NDC also agrees with and commends CNPP on its approach to making the FGP a scientific evidence-based document and encourages the Center to continue its steadfastness of evaluating the science as it evolves and taking action when appropriate.

The USDA CNPP has solicited comments on proposed revisions to the daily food intake patterns that serve as the technical basis for the FGP. NDC believes that proposed revisions to the FGP is an extremely important issue that needs adequate time and information for accurate and thoughtful comment. In terms of needed information, NDC recommends that CNPP make available all calculations and supporting information, including, but not limited to, nutrient composites for the food groups and subgroups and weightings for foods commonly consumed by Americans. In this way, others could develop thoughtful food pattern alternatives for consideration.

Specifically, the CNPP has particular interest in receiving comments on the five questions outlined in the Federal Register notice. NDC has addressed these in the following document.

Food guides are updated infrequently, and yet have profound impact on consumer understanding and trust in government recommendation of what and how to eat to promote health and prevent disease. It is imperative that CNPP's proposed food patterns do not place the public at risk of calcium inadequacy, jeopardize consumer confidence in what to eat or ignore the need to promote increased physical activity within the population.

Thank you for the opportunity to comment on these very important issues.

Sincerely,

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1. **Appropriateness of using *sedentary, reference-sized individuals* in assigning target calorie levels for assessing the nutritional adequacy and moderation of each food intake pattern.**

In its document, the CNPP points out that: "The calorie levels for food patterns used in comparing intakes with nutritional goals are those that are appropriate, on average, for sedentary individuals in each age/gender group."[1] The apparent rationale for basing the target caloric pattern on a sedentary approach was that, "Given the sedentary lifestyles of many Americans, it was considered better not to assume any specific level of physical activity."[1]

Based on scientific research and goals stated by the IOM and the Dietary Guidelines for Americans, using sedentary energy levels for target calories in food patterns is not in the public health interest. As a public health priority, the government needs to promote increasing physical activity, not reinforce sedentary lifestyles, which would be consistent with the 2000 edition of the Dietary Guidelines. Although it is common knowledge that regular exercise is healthful, more than 60 percent of Americans are not regularly physically active, and 25 percent are not active at all. It is reasonable to anticipate that this current trend will continue unless there are effective and appropriate interventions. The trend for decreased activity by adults is similar to trends for children to be less active in and out of school. As both lack of physical activity and obesity are now recognized as risk factors for several chronic diseases, logic requires that activity recommendations accompany dietary recommendations.

For example, one of the major findings in the Institute of Medicine (IOM) DRI Macronutrient report includes recommendations for levels of physical activity to decrease risk of chronic disease [2]. The Macronutrient Report recommendation "Integration of Macronutrients in the Diet (eight steps to a healthy diet)," advises integrating the dietary recommendations for macronutrients along with adopting an active lifestyle consisting of a physical activity level (PAL) of ≥ 1.6, which equates to walking at 4 miles/hr for one hour [3]. This recommendation is not viewed as aspirational but, rather, stresses the importance of balancing diet with exercise by pointing out that, "to maintain cardiovascular health, regardless of weight, adults and children should achieve a total of at least one hour of moderately intense physical activity each day." The recommendations to increase physical activity are consistent with the Surgeon General's Report [4] and Healthy People 2010 [5].

Furthermore, it is also generally accepted that weight-bearing physical activity determines the strength, shape, and mass of bone [6, 20]. The health benefits of exercise are well accepted. This has led numerous organizations to engage in increasing physical activity in the U.S. One effort is the Action For Healthy Kids program, which is working to create a healthy school environment. Fitness experts, educators and nutritionists are working together to implement activities to increase nutrition education and physical activity in schools.

The FGP is the primary education tool for putting the Dietary Guidelines into practice for consumers. The FGP should be more about educating and advocating energy levels that are consistent with the promotion of physical activity and energy balance rather than sedentary lifestyles. The proposed target energy levels ("Target Pattern") should be consistent with a

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calorie intake that combines both diet and physical activity goals for energy balance. Hence, given the obesity epidemic, it is more appropriate from a public health and consumer education perspective to base the "Target Pattern" for energy intake on goals that are consistent with promoting a lifestyle of increased physical activity and caloric balance rather than on a sedentary construct.

There is overwhelming evidence that individuals with moderate to high levels of physical activity have lower mortality rates than sedentary individuals, and also that regular exercise contributes to a sense of overall well-being. In light of the strong and specific physical activity recommendations set forth in the IOM DRI Macronutrient report, which stresses the importance of balancing diet with exercise, the proposal to use sedentary, reference-sized individuals in assigning target calorie levels for assessing the nutritional adequacy of each food intake pattern is inconsistent with the CNPP goals for the FGP to be a dietary guidance tool based on the latest scientific standard for healthful eating.

Based on the benefits associated with the "low-active" and "active" physical activity patterns as outlined in the Macronutrient report, it would be in the best interests of Americans for CNPP to be consistent with these recommendations and to incorporate the IOM physical activity recommendations into the Daily Food Guide Patterns. At the very least, CNPP should develop food patterns for different activity levels to show how to moderate calorie levels based on activity.

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2. Appropriateness of the *selection of nutritional goals* for the daily food intake patterns (i.e. CNPP-Table 3, 'Nutritional Goals for Proposed Daily Intake Patterns').

The CNPP proposed food intake patterns are very likely to exacerbate the calcium crisis in the U.S.

The CNPP points out that, "The goal for each (Daily Food) pattern is to have an intake at the RDA or Adequate Intake level or higher, but less than the Upper Limit of intake for that nutrient"[1]. However, based on the nutrient composition of the food intake patterns noted in CNPP-Table 5, four groups do not meet 100 percent of AI for calcium with 2-3 servings of dairy. These include children (9-13 yrs) and adolescent females (14-18 yrs), who are already at-risk populations not meeting the DRI calcium goals even with 3 servings of dairy under CNPP's proposed food patterns.

Although these levels are 93 – 98% of the AI for calcium, the DRI panel has made it clear that, "Groups with mean intakes at or above the AI can generally be assumed to have a low prevalence of inadequate intakes (low group risk) for the defined criterion of nutritional status." "If the mean intake of a group is at or above the AI, and the variance of intake is similar to the variance of intake used in the population originally used to set the AI, prevalence of inadequate nutrient intakes is likely to be low (although it cannot be estimated). This evaluation can be used with confidence when the AI is based directly on intakes of healthy populations."[7] Hence, one cannot assume that there is a low prevalence of inadequate intake for calcium in these groups, especially considering the vulnerability of this population to increased forearm fractures [8] and their history of low calcium intakes.

Currently, only about 38% of males and 29% of females aged 6 to 11 and 32% of males ages 12 to 19 and 12% of similar aged females consume 100% of the AI for calcium [9]. Children and adolescents' low calcium intake is of great concern considering that the teenage years are a period of rapid skeletal growth during which there is a critical "window of opportunity" to maximize peak bone mass and protect the skeleton against future risk of osteoporosis [10-12]. About 95% of females' total body mineral content is reached by 20 years of age [12]. After adolescence, the period for optimizing peak bone mass by calcium rapidly declines. It is important to note that the 1300 mg/d calcium recommendation for adolescents was based on the minimum calcium intake for some adolescents to reach 100% calcium retention [13].

The assessment of calcium needs is valid on an individual basis as well, as indicated by the IOM report, which states, "If an individual's usual intake equals or exceeds the AI, it can be concluded that the diet is almost certainly adequate. If, however, their intake falls below the AI, no quantitative (or qualitative) estimate can be made on the probability of nutrient inadequacy."[7] Clearly, for these populations, and for individuals within these populations, any proposed food pattern should recommend achievement of 100% of the calcium AI.

There seem to be inconsistencies in CNPP applying its own philosophical goals on being realistic and practical. The CNPP points out in reference to meeting the RDA for vitamin E that, "Meeting the new RDA, especially at lower calorie intake, would require substantial changes from typical intakes and would require the use of foods not commonly consumed," and, "This is not consistent with the philosophical goal of being realistic and practical."[1]

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We respectfully submit that the Daily Food Intake Patterns, as currently proposed by CNPP (CNPP-Table 1), have created a similar highly unrealistic situation for attaining the AI for calcium, a nutrient that is essential for bone development and is especially critical for children and adolescents during the period of peak bone mass development. NDC is very concerned that the proposed food intake patterns, if adopted, may increase costs while exacerbating the current calcium crisis in the U.S. because of the emphasis CNPP has placed on recommending unrealistically high amounts of vegetable subgroups (i.e. dark-greens [DGL], Deep-yellow [DY] and legumes [LEG]) and whole grains as non-dairy calcium sources.

CNPP's own nutrition experts agree on this issue by pointing out that, "....increasing servings of food groups other than milk to meet calcium and magnesium DRIs is less likely to be practical, at least in the near term. The FGP already recommends more servings of dark-green leafy vegetables, legumes, and whole-grain products than are currently consumed by most Americans. Substantial quantities of these foods would be required to meet the increase in the DRIs for calcium----somewhat less for magnesium. Although consumption of these nutritious foods is to be encouraged for everyone, at this time it is probably not realistic to recommend significant increases in numbers of servings from these groups as a strategy for meeting new calcium and magnesium DRIs."[13] Furthermore, as pointed out in Healthy People 2010, "With current food selection practices, use of dairy products may constitute the difference between getting enough calcium in one's diet or not."[14]

The suggested increased amounts of DGL, DY and LEG for the 2200 and 2800 calorie levels are 30 – 50% higher than the current Food Guide Pyramid recommendations; 3-4 times (i.e. 300 – 400%) higher than current consumption by Americans >2 years [15]; and 6 - 8.5 times (600 – 850%) higher than current consumption by children 2 – 19 years of age [15]. The suggested amounts of whole grains recommended for the 2200 and 2800-calorie levels are 4.5 to 5.5 times (450 – 550%) higher than Americans currently consume [15]. Based on CNPP-Table 5, the CNPP is suggesting that the proposed increased consumption of these vegetable sub-groups and whole grains will result in total non-dairy calcium intakes of approximately 303, 433, and 546 mg for 1600, 2200, and 2800 calorie patterns and, it reasons, coupled with the currently recommended 2 – 3 servings of dairy, that Americans will be able to achieve the AI for calcium (CNPP-Table 5).

While NDC supports increased consumption of fruits, vegetables and whole grains, daily food patterns should not put consumers at risk of calcium inadequacy. In reality, Americans are not consuming fruits, vegetables and grains in amounts that will achieve the levels of non-dairy calcium suggested by CNPP in CNPP-Table 5. Trend data from the 5-A-Day for Better Health program also show small insignificant changes in vegetable consumption over a five year period that are not consistent with CNPP targets [16]. Currently, the estimated non-dairy calcium consumption in the U.S. is 226 mg for 2-8 yrs old, 302 mg for 12-19 yrs old, and 358 mg for 19-50 yrs olds, requiring at least 3 servings of dairy for most Americans to achieve the calcium DRI and 4 servings for those groups with higher DRI intake recommendations (**Table 1**).

NDC respectfully submits that the goals for increased fruits, vegetables and grains are laudable on one hand, but are highly unrealistic approaches for meeting calcium requirements. More importantly the unrealistic recommendations could have major negative public health implications, as suggesting that increased consumption of fruits, vegetable subgroups, whole grains and refined grains will contribute substantial amounts of calcium to the diet detracts from developing meaningful solutions to the calcium crisis, namely through the use of dairy products. These recommendations fail to meet CNPP's own goals of being realistic and practical.

"Goals should be based on the use of commonly used foods, rather than depending on infrequently consumed foods that are unusually rich in certain nutrients."[1]
As previously stated, the proposed amounts of vegetable consumption (i.e. DGL, DY, LEG) for each Pyramid food pattern are 30 – 50% higher than the current Food Guide Pyramid recommendations; 3-4 times higher than current consumption by Americans >2 years [15]; and 6 - 8.5 times higher than current consumption by children 2 – 19 years of age [15].

The CNPP states that the "…amounts suggested to be eaten from the group are altered to be nutritionally appropriate---for example, the amounts of whole grains, dark-green vegetables, legumes, and fruits suggested are higher than current intakes. Amounts of whole grains, dark-green vegetables, and legumes are also higher than in the original Pyramid food patterns at similar calorie levels."[1]

NDC notes that the proposed levels of dark green leafy vegetables is 0.43 servings/day (@1800 kcal/day pattern), a level that is two-fold and four-fold higher than current consumption by adults and children, respectively [15]. USDA consumption trend data, however, show that total vegetable consumption has not improved much in adults, and there has been virtually no improvement in children over a five-year period (**Table 2**). Moreover, in-home consumption trends for dark green vegetables, deep yellow vegetables and legumes have had overall negative growth between 1995 and 2003 (**Table 3**) [17]. As pointed out by CNPP's Executive Director, a key philosophical goal for a new food guide is that it should meet its nutritional goals in a *realistic manner*. It should be *useful* with *recognizable food groups* [18]. Based on the above data for vegetable consumption trends, CNPP's recommended levels of dark green vegetables, deep yellow vegetables and legumes are highly unrealistic. Hence, CNPP's recommendations should be consistent with its own guiding principles. CNPP would benefit from examining alternative food patterns that may provide a more practical and realistic way to meet nutrient goals.

Calcium status can be altered by poor absorption from some vegetable sources
Poor bioavailability of calcium from some vegetables and legumes has been noted in the DRI report for calcium as an issue that can affect calcium requirements. Specifically, the DRI panel stated, "It should be noted that calcium may be poorly absorbed from foods rich in oxalic acid (spinach, sweet potatoes, rhubarb, and beans) or phytic acid (unleavened bread, raw beans, seeds, nuts and grains, and soy isolates) [19]. In comparison to calcium absorption from milk, calcium absorption from dried beans is about half and from spinach is about one tenth." This means that a dark-green vegetable such as spinach, for example, containing 291 mg of calcium per serving, would provide only 29 mg to the body. Additionally, a serving of legumes such as

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dried beans, containing 127 mg of calcium, would provide only 63 mg to the body. Hence, considering the high amounts of DGL, DY, and LEG vegetables suggested for each food pattern (CNPP-Table 1), the amount of calcium contributed by each food pattern given in CNPP-Table 5 may be substantially overestimated, resulting in highly inaccurate conclusions about the percent of the calcium AI being met by each food pattern.

This problem is particularly pronounced in male and female adolescent groups in CNPP's proposed Food Guide Patterns, who are already at risk as discussed above. CNPP should revise the Food Patterns for these at-risk groups to include four servings of dairy. There is substantial public health risk associated with implying that increased consumption of these vegetable subgroups will contribute significant amounts of calcium to the diet because it detracts from developing meaningful solutions to the calcium crisis, namely through the use of dairy products. It is important that consumers receive the most accurate food guidance available in order to achieve calcium recommendations.

The most practical and realistic way to add calcium to the diets of Americans is through dairy products. Dairy foods are a cost-effective and convenient way to enhance the nutritional quality of a diet. Dairy foods are an excellent to good source of many nutrients beyond calcium. With the numerous low-fat dairy options available, Americans should be urged to increase dairy product consumption.

The proposed Food Intake Patterns will not meet the AI for calcium without recommending one additional serving from the milk group

The Food Intake patterns proposed by CNPP in CNPP-Table 1 suggest daily intake amounts of foods from the pyramid food groups that, when consumed, will meet the nutritional goals for each of the nutrients shown in CNPP-Table 5. Based on the types and amounts of foods recommended in CNPP-Table 1, however, it is highly unlikely that the AI for calcium will be achieved by most Americans because of the unrealistically high levels of fruits, vegetables and whole grains, and inadequate amounts of milk being proposed. This point is echoed by Shaw et al. [13] who point out that, "Increasing servings of food groups other than milk to meet calcium and magnesium DRIs is less likely to be practical, at least in the near term. The Food Guide Pyramid already recommends more servings of dark-green leafy vegetables, legumes, and whole-grain products than are currently consumed by most Americans. Substantial quantities of these foods would be required to meet the increase in the DRIs for calcium---- somewhat less for magnesium. Although consumption of these nutritious foods is to be encouraged for everyone, at this time it is probably not realistic to recommend significant increases in numbers of servings from these groups as a strategy for meeting new calcium and magnesium DRI."[13] These authors conclude that, "To meet new recommended levels of calcium, suggesting an additional serving from the milk group beginning by age 9 is likely to be a practical option."

This issue is clearly evident in the food intake patterns noted in CNPP-Table 5, in which four groups do not meet 100 percent of AI for calcium with 2-3 servings of dairy. These include children (9-13 yrs) and adolescent females (14-18 yrs), who are already at-risk populations not meeting the DRI calcium goals even with 3 servings of dairy under CNPP's proposed food

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patterns. As discussed elsewhere in this letter one cannot assume that there is a low prevalence of inadequate intake for calcium in these groups, especially considering the vulnerability of this population to increased forearm fractures [8] and their history of low calcium intakes. Clearly, for these populations, and individuals within these populations, to meet calcium intake recommendations, an additional serving from the milk group is important to assure achievement of meeting 100% of the AI.

Although the current FGP recommendations call for 2 - 3 daily servings from the milk group, some well-grounded government and physician health organizations recommend up to four servings of dairy per day to meet daily calcium needs including Health Canada [20], The American Academy of Pediatrics [21] and the American Heart Association [22].

For Americans with lactase non-persistence, which may produce lactose intolerance, research shows that they can still enjoy dairy products and reap the health benefits. There also are a variety of lactose-reduced and lactose-free milk products readily available today that provide all the nutritional benefits found in traditional dairy products.

- ***Three to four servings from the milk group are necessary to meet the DRI and to ensure adequate intakes of calcium.***

The NDC concurs with CNPP that it is appropriate to base the *adequacy goal* for nutrients on the RDA or Adequate Intake (AI) rather than the EAR because the food guide patterns are meant for individuals rather than groups. NDC acknowledges that there are multiple ways for consumers to achieve nutrient *adequacy and moderation goals*. However, the approach CNPP has taken is a dietary prescriptive approach based on food simulations to meet the RDA for nutrients with foods that have a low prevalence of intake, and food guide patterns that, without testing for feasibility, are not likely to be consumed. Based on the current trends in consumption, it is highly unlikely that Americans will consume the amount of calcium from fruits, vegetables and whole grains as suggested in CNPP-Table 5. The result is-----Food Intake Pattern recommendations that end up exacerbating low calcium intake by promoting the intake of foods that are generally poor sources of calcium and have a low probability of consumption, and limiting the intake of excellent sources like low-fat dairy products with a substantially greater probability of consumption. Food Intake Pattern recommendations should balance the need for managing calories, while using naturally nutrient dense foods to address critical nutrient needs such as calcium for growth and development.

The following solution is a more practical alternative Food Intake Pattern for CNPP's consideration:

- **Use current FGP recommended amounts for: vegetables, fruits and grains**
- **Add one additional serving of low-fat/fat-free milk (i.e. 3-4 servings/day)**
- **Remove one refined grain serving**

- ***Adding one additional daily FGP serving of non-fat or low-fat dairy lowers saturated fat and does not increase calories***

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NDC evaluated the nutrient compositional effects of adding additional FGP servings of low-fat or fat-free dairy products (milk and yogurt) to sample illustrative USDA menus developed for using the Food Guide Pyramid [23]. In these examples, foods in each daily menu representing one serving of a refined grain from the bread group was replaced with one serving from the milk group (milk, yogurt). A total of 5 days of menus at three calorie levels (1600, 2200, and 2800 calories) were evaluated.

Tables 4a – 4e example menus show the results of replacing one serving of refined grains and its accompanying condiments (margarine, jelly, etc.) with one serving of dairy for 5 days of 1600 calorie menus. Servings from the Bread group were reduced from approximately 6-7 per day to 5-6 per day, while the Milk group increased from approximately 2 servings per day to 3 servings per day. Total fat and saturated fat grams were reduced by an average of 9.6% and 6.6% respectively across the 5 days, while total daily calories were not meaningfully altered.

Table 5a – 5e example menus show similar results for the 2200-calorie menus. Servings from the Bread group were reduced from approximately 7 – 10/day to 6 – 9/day, while dairy servings increased from about 2 –3/day to 3 - 4/day. Total fat and saturated fat grams were reduced by an average of 4.2% and 6.2% respectively, while total calories were not meaningfully altered.

Table 6a – 6e example menus also show similar results for the 2800-calorie menus. Servings from the Bread group were reduced from a range of 6.5 – 13.5/day to 5.5 – 12.5/day, while dairy servings increased from a range of 2.25 – 3.3/day to 3.25 – 4.3/day. Total fat and saturated fat grams were reduced by an average of 9% and 6.8% respectively, while total calories were not altered.

These data demonstrate the feasibility of increasing dairy from 2 – 3 servings/day to 3 – 4 servings/day in the diet. This increase would result in favorable changes in total fat, saturated fat and calories, as well as substantial increases in calcium (approximately 302 mg/serving) and other nutrients associated with milk, including potassium, magnesium, phosphorus, and vitamins A, D, B_{12}, riboflavin and niacin.

These examples also indicate that removing one refined grain serving and adding one low-fat/fat-free dairy serving is practical, realistic and easy for consumers.

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Recently, NDC has examined alternative approaches for ways to meet the DRIs for calcium.

1. **Assessment of calcium intake when meeting FGP recommendations.**

SUMMARY

NDC assessed the calcium intake of various age groups using both the Continuing Survey of Food Intake by Individuals, 1994-96, 1998 [24] and NHANES, 1999-2000 [25]. Groups that met, and on average exceeded, the FGP dairy recommendations were more likely to have a mean calcium intake above the AI for calcium, which means the likelihood of inadequate calcium intake in these groups was low.

***However, it is important to note that the groups that met, and on average exceeded, the FGP dairy recommendations had an average dairy serving intake about one serving higher than current recommendations.* This indicates that the number of dairy servings recommended by the FGP should be increased by one serving to ensure the likelihood of inadequate intake of calcium is low.**

Currently, the DRI panel does not recommend the use of the AI or the RDA to assess inadequate intakes of groups [26]. However, the DRI panel has indicated, "Groups with mean intakes at or above the AI can generally be assumed to have a low prevalence of inadequate intakes (low group risk) for the defined criterion of nutritional status." [26] Hence, we used the mean intake of calcium to determine if the prevalence of inadequate intake of calcium is likely to be low. For example, if the mean intake of a group of individuals aged 9-18 years (AI of calcium for this age group is 1300 mg/day) is greater than 1300 mg/day, then the likelihood of this group having an inadequate intake of calcium is low. With this approach, we can examine the number of dairy servings per day necessary for various age groups to ensure the likelihood of inadequate calcium intake is low.

We separated groups by age based on major differences in the DRI for calcium, namely 2-8 years, 9-18 years, 19-50 years and 51+ years. We did not separate the data by gender, as the DRI for calcium are the same for each gender.

Fig 1 and Table 7 show the mean calcium intake based on whether individuals within a particular age category met the current FGP recommendation for dairy servings consumption from CSFII. The average number of dairy servings for the children 2-8 years who met, and on average exceeded, the FGP recommendations to consume 2 or more FGP dairy servings per day was 2.95 dairy servings per day. With this level of dairy consumption, the mean intake of calcium in the 2-8 year olds who met the FGP dairy recommendations was 1145 mg/day. Since the mean calcium intake of this group meeting the recommended FGP dairy servings exceeds the AI for calcium for this age group (estimated as 714 mg/day),* we conclude that when children this age consume approximately three servings of dairy products per day, there is a low likelihood that this group has inadequate calcium intake.

In contrast, the 2-8 year olds not meeting the FGP dairy recommendations only consumed an average of 1.22 dairy servings per day, and mean calcium intake of this group was only 607 mg/day. In children 9-18 years of age, the group with the highest AI for calcium (1300 mg/day), the mean calcium intake was 935 mg/day, (**Fig. 1 and Table 7**) less than the AI for

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calcium for this group. Therefore, we cannot conclude the likelihood of inadequate calcium intake in this group is low. Individuals in this age group that met or exceeded the FGP dairy recommendation (19.2% of this age group) consumed, on average, 4.2 dairy servings per day and 1665 mg calcium per day. Since the mean calcium intake of the group that met or exceeded the FGP dairy recommendation surpasses the AI for calcium, we can conclude that when children 9-18 years of age consume approximately four servings of dairy per day, there is a low likelihood that this group has inadequate calcium intake. The 9-18 year olds not meeting the FGP dairy recommendations only consumed an average of 1.45 dairy servings per day, and mean calcium intake of this group was 748 mg/day, less than half of calcium intake of peers that met the recommended number of dairy servings per day.

In adults aged 19-50 years, mean calcium intake was 787 mg/day. The adults in this group that met, and on average exceeded, the FGP dairy recommendation (22.9% of this age group) consumed an average of 3.20 dairy servings per day and had a mean calcium intake of 1420 mg/day (**Fig. 1 and Table 7**). The adults in this age group that did not meet the FGP dairy recommendation consumed an average of 0.87 dairy servings per day and less than 600 mg calcium/day. Given that the mean calcium intake of this group of adults that met or exceeded the recommended number of dairy servings surpasses the AI for calcium (1000 mg calcium per day), we conclude that when adults aged 19-50 years of age consume an average of 3.20 servings of dairy products per day the resulting calcium intake exceeds the AI for this group and, thus, the prevalence of inadequate intake in these adults is likely to be low. This conclusion cannot be made for adults in this age group that did not consume the recommended number of dairy servings.

[1]For older adults (51+ years), only 5.3% of this age group in CSFII met or exceeded the recommended 3 dairy servings per day (**Table 7**). The mean calcium intake of this age group was 674 mg/day, significantly lower than the 1200 mg of calcium per day recommended for this age group. Thus, we cannot conclude that the likelihood of inadequate calcium intake in this group is low. When the recommended number dairy servings were met, and on average exceeded, by individuals in this age group, the mean calcium intake was 1567 mg/day, and the average dairy consumption of the group meeting and on average exceeding the FGP dairy recommendation was 3.87 servings per day (almost a serving higher than current FGP dairy recommendation). Only in the group meeting the FGP dairy recommendation, averaging a consumption of almost four servings of dairy servings per day, can we conclude that the prevalence of inadequate intake of calcium is likely to be low.

2. **Assessing the ideal level of dairy servings to meet calcium recommendations.**

SUMMARY

Using current nutrient intake data from CSFII and NHANES 1999-2000 we have shown that groups that exceed the FGP dairy recommendations (2-3 servings/day) are more likely to

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[1] *Individuals 2-3 years of age have an AI of 500 mg calcium/day while individuals aged 4-8 have an AI of 800 mg calcium/day. Since seven years are represented in the 2-8 year group, we combined 2/7 of the 500 mg/day AI with 5/7 of the 800mg/day to obtain 714 mg/day as an average AI for the entire group -- 0.285*500 + 0.714*800).

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have a mean calcium intake above the AI for calcium, which means the likelihood of inadequate calcium intake in these groups is low.
The groups that met, and on average exceeded, the FGP dairy recommendations had an average dairy serving intake about one serving higher (3-4 servings/day) than the current recommendation.

When we estimated the ideal number of dairy servings required to meet the DRI for calcium we conclude the following:

1) **Children 2-8 years of age need at least 2 servings of dairy per day;**
2) **Children 9-18 years of age need on average 4 servings of dairy per day;**
3) **Adults aged 19-50 years of age need at least 3 servings of dairy per day; and**
4) **Adults older than 51 years of age need 3 servings of dairy per day to meet calcium recommendations.**

To help determine the ideal level of dairy consumption to meet the calcium DRI, we then examined calcium intake by various levels of dairy consumption from CSFII. We separated individuals in the four age classifications used previously into six levels of dairy consumption per day: 1) less than one serving; 2) 1.0 to 1.5 servings; 3) 1.5 to 2.5 servings; 4) 2.5 to 3.5 servings; 5) 3.5 to 4.5 servings; and 6) > 4.5 servings. We then calculated the mean calcium intake and the percentage of the population not meeting the respective DRI for these nutrients. Table 8 presents calcium information from CSFII. Given the limitation discussed above regarding using the AI for calcium to determine inadequate intake, and to be consistent with the DRI panel approach for dietary assessment, we used the first group mean intake equal to or greater than the AI (which means the likelihood of inadequate calcium intake in the group is low) to determine the ideal level of dairy consumption.

In children 2-8 years of age, 1.5 to 2.5 servings (average about two servings per day) appeared to be the first intake level to exceed the AI for this age group (**Fig. 2 and Table 8**; an average of 700 mg calcium per day -- 0.33*500+0.67*800). In children 9-18 years of age, with an AI of 1300 mg calcium/day, the first group mean intake above the AI was at 3.5 to 4.5 dairy servings per day (**Fig. 2 and Table 8**; average 3.92 servings per day). For adults 19-50 years of age the first group mean intake greater than the AI for this group (1000 mg calcium/day) occurred at 2.5 to 3.5 dairy servings per day (average 2.94 servings per day). In adults older than 50 years of age, the first group mean intake to exceed the AI of 1200 mg calcium per day occurred at 2.5 to 3.5 dairy servings per day (average 2.89 servings per day). **Table 9** presents calcium data from NHANES 1999-2000. Results were very similar to data from CSFII, namely:

1) 1.5 to 2.5 servings of dairy (average dairy servings were about two servings per day) were necessary for children 2-8 years of age for the group mean calcium intake to exceed the AI for calcium of this group (average AI of 700 mg calcium/day);

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2) 3.5 to 4.5 servings of dairy (average dairy servings were about four servings per day) were necessary for children 9-18 years of age for the group mean calcium intake to exceed the AI for calcium of this group (AI of 1300 mg calcium /day);
3) 2.5 to 3.5 servings (average dairy servings were about three servings per day) of dairy were necessary for adults 19-50 years of age for the group mean calcium intake to exceed the AI for calcium of this group (AI of 1000 mg calcium/day);
4) 2.5 to 3.5 servings (average dairy servings were about three servings per day) of dairy were necessary for adults 50+ years of age for the group mean calcium intake to exceed the AI for calcium of this group (AI of 1200 mg calcium/day).

Taken together, these data indicate that recommending 3-4 servings from the milk group for all individuals older than 9 years of age is necessary in order to meet the DRI's and to ensure adequate intakes of calcium.

CNPP needs to consider Food Intake Pattern recommendations using naturally nutrient dense foods to address critical nutrient needs such as calcium for growth and development. Once again, the following solutions provide an alternative Food Intake Pattern for CNPP's consideration:

- Use current FGP recommended amounts for: vegetables, fruits and grains.
- Add one additional serving of low-fat/fat free milk (i.e. 3-4 servings/day).
- Remove one refined grain serving.

As discussed elsewhere in this letter, NDC's nutritional assessment of replacing one serving of a refined grain with additional servings from the milk group demonstrated the feasibility of increasing dairy from 2 – 3 servings/day to 3 – 4 servings/day. This increase resulted in favorable changes in total fat, saturated fat and calories as well as substantial increases in calcium (approximately 302 mg/serving) and other nutrients associated with milk including potassium, magnesium, phosphorus, and vitamins A, D, B_{12}, riboflavin and niacin.

Recommending one additional serving from the milk group can help lower chronic disease risk

As outlined in the comments above, it is highly unlikely that adequate calcium intake will be achieved by most Americans based on the proposed Daily Food Intake Patterns. The more appropriate and effective strategy is to consider naturally nutrient (calcium) dense foods that consumers recognize and will consume such as low-fat dairy products. In order to effectively meet the DRI's for calcium, research outlined above indicates that 3 – 4 Food Guide Pyramid servings per day from the milk group are necessary, rather than the current 2 – 3 servings recommended by the FGP.

A growing body of literature also exists indicating that consumption of 3-4 servings of dairy foods per day also helps to lower the risk for the following chronic disease conditions, many of which are costly as well as responsible for considerable morbidity and mortality. Data discussed below also suggest that an adequate intake of dairy foods (3-4 servings per day), with their broad complement of essential nutrients, is shown to be a common factor in the reduction of the disease burden and healthcare costs of several medical conditions.

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IMPACT OF DAIRY FOODS ON CHRONIC DISEASE RISK

Osteoporosis

Osteoporosis is characterized by low bone mass and bone tissue deterioration, leading to skeletal fragility. Bone mass later in life is determined primarily by peak bone mass, of which more than 90% is attained by 20 years of age. Osteoporosis is recognized today to be a "pediatric disease with geriatric consequences." [27] Dietary calcium intake early in life is positively associated with bone mass [28,29]. In a cross-sectional study of 139 women, Nieves et al. [28] found that higher lifetime calcium intake was associated with higher hipbone density compared with low lifetime calcium intake. These authors estimated that an increase in teenage calcium intake from 800 to 1,200 mg per day would increase hipbone density by 6%. In an analysis of papers published since 1975 describing studies of the relationship of calcium intake and bone health, Heaney [30] found that of 52 investigator-controlled calcium intervention studies, 50 demonstrated better bone balance at high intakes, greater bone gain during growth, reduced bone loss in the elderly, or reduced fracture risk.

Of the 86 observational studies, 64 were positive; confirming that the causal relationship observed in the intervention studies also exists in free-living persons. Fully three-fourths of the observational studies support the hypothesis that increased calcium and calcium-rich dairy foods protect the skeleton.

Six of the intervention studies used dairy foods as the calcium sources and all reported the positive link between calcium intake and bone health. All showed significantly positive effects that were as strong or stronger than the effects of calcium supplements. This is not surprising as it is long established and well understood that milk supports growth; thus, it is evident that milk and milk products are good sources of the nutrients needed for bone development and maintenance.

At least four randomized clinical trials (RCT) have reported significant fracture reduction with increased calcium intake [27-30]. For example, Chapuy et al. [31] employed a combination of calcium, phosphorus, and vitamin D, and observed an approximately 40% reduction in hip and other extremity fractures within 18 months. Dawson-Hughes et al. [32] reported that supplementation with calcium and vitamin D reduced non-vertebral fractures by 55% within 3 years. These studies also highlight the importance of the multiple nutrients existing in combination in dairy foods. In an osteoporosis prevention study in which women received 1000 mg/day calcium via either a supplement or milk, the latter group concurrently and significantly improved the intake of 11 other key dietary nutrients. Analysis by Barger-Lux and Heaney [33] of the diets of premenopausal women revealed that women consuming <60% of recommended levels of calcium also were consuming inadequate levels of at least four other key nutrients that are delivered by dairy foods.

Summary

While the importance of calcium to bone health early in life is well established, its importance to skeletal integrity across the life span is also well accepted. Inadequate calcium and dairy food intake in youth sets the stage for skeletal fragility in later life, resulting in osteoporosis and increased risk of osteoporotic fractures, which can be debilitating and life-threatening. Dietary calcium has been unequivocally demonstrated to enhance bone health at every stage of life, with high routine intakes being associated with formation of greater bone mass in childhood and adolescence and with reduced bone loss and fracture risk in the elderly. The data regarding bone health and calcium and

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dairy products validate the critical need for regular, lifelong consumption of at least 3 - 4 dairy servings a day to maintain the structural integrity of the human skeleton.

Hypertension

Substantial scientific evidence indicates that calcium or calcium-rich dairy foods have a beneficial effect on blood pressure regulation [34-42]. A 1984 analysis of the first National Health and Nutrition Examination Survey (NHANES I), comprising dietary data from more than 10,000 American adults identified an inverse association between dietary calcium and blood pressure levels; dietary calcium intake >1000 mg was associated with a 40-50% reduction in hypertension prevalence [43]. Of the 17 nutrients assessed in that study, including sodium and potassium, calcium was the only nutrient that differed significantly in intake between persons with and without hypertension. The relationship between higher calcium intake and lower blood pressure has now been reported in numerous population surveys [reviewed in 40-42].

RCTs that have assessed the effects on blood pressure of calcium or dairy products have confirmed a blood pressure-lowering effect of adequate calcium consumption from foods and from supplements [34-36, 39]. Although blood pressure responses to modifications in nutrient intake typically vary among individuals, the beneficial blood pressure effect tends to be more consistent when foods rather than calcium supplements are used as the mineral source (34, 35, 44). This finding indicates that calcium may serve as a marker for dairy foods, and that observed blood pressure benefits are not derived solely from calcium, but from the full nutritional profile of dairy foods, which include multiple minerals, vitamins, protein and essential fatty acids.

In the landmark controlled-feeding intervention trial *Dietary Approaches to Stop Hypertension* (DASH) [34], persons with high-normal blood pressures consumed one of three diets for 8 weeks. A control, or "typical American," diet was compared to a diet rich in fruits-and-vegetables (8-10 servings/day) and a similar fruits-and-vegetables diet that also included 3 servings of dairy products/day and was lower in total fat, saturated fat and high in fiber. The latter, the "DASH diet," resulted in impressive reductions in both SBP (5.5 mm Hg) and DBP (3 mm Hg) compared to the control, or typical American, diet. The fruits-and-vegetables diet (without the dairy component) produced blood pressure reductions of roughly half that magnitude (SBP 2.7 mm Hg; DBP 1.9 mm Hg).

Subgroup analysis of the trial revealed even more profound effects of the DASH diet within certain populations. Among African-Americans, the DASH diet resulted in blood pressure reductions of 6.9 mm Hg systolic and 3.7 mm Hg diastolic compared to the control diet [45]. These reductions were approximately double those achieved with the fruits-and-vegetables diet that did not include dairy foods. Particularly noteworthy in this cohort, in which lactose maldigestion is presumed to occur more commonly than in other racial groups, was the lack of adverse gastrointestinal effects that might be expected with the addition of 3 dairy servings to the daily diet [34].

Blood pressure changes with the DASH diet were most dramatic in persons with established hypertension (SBP ≥140 mm Hg or DBP ≥ 90 mm Hg). While the fruits-and-vegetables diet compared to the control produced decreases of 7.2 SBP and 2.8 mm Hg DBP, the DASH diet, with its inclusion of dairy foods, resulted in decreases of 11.4 mm Hg SBP and 5.5 mm Hg DBP. As noted by the investigators, these blood pressure improvements rival those attainable with antihypertensive

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medications [34]. At study completion, 70% of the DASH diet group had normal blood pressure (SBP <140, DBP <90 mm Hg), compared with 23% of the control group and 45% of the fruits-and-vegetables diet group [46].

The effects on blood pressure of the DASH diet were further examined in the DASH-Sodium Trial, in which the diet was tested with various levels of sodium [47]. As seen in the first DASH Trial, blood pressure was significantly reduced in persons consuming the DASH diet compared to the control diet, and this occurred across all levels of sodium intake. This study confirmed that for most adults, with the exception of older persons with established hypertension, regular consumption of a high quality diet, rich in fruits, vegetables, and dairy products, is the optimal dietary means of controlling blood pressure.

The recently published results of the PREMIER Trial, an RCT assessing effects of simultaneous lifestyle modifications to improve blood pressure including the DASH diet, demonstrate the feasibility of increasing dairy intake [48]. In the DASH diet group in this study at 6 months, consumption of dairy products was significantly increased, with nearly 60% of participants at the dairy goal, compared to only one-third achieving the fruits-and-vegetables goal.

In the Coronary Artery Risk Development in Young Adults (CARDIA) Trial, a multicenter population-based prospective observational study, a consistent reduction was observed in the incidence of hypertension with higher consumption of dairy foods – including low- and full-fat varieties, butter and ice cream – (p for trend <0.001) in overweight individuals (≥25 kg/m^2) [49]. Other factors related to the insulin resistance syndrome (IRS) were also lower with higher dairy intake, including obesity, abnormal glucose tolerance, and dyslipidemia. The 10-year cumulative incidence of hypertension with the lowest dairy consumption (<10 times/week or <1.5 servings/day) was 22.9% compared to 8.7% in those with the highest (≥35 times/week or ≥5 servings/day). The odds of elevated blood pressure were considerably lower with both low-fat (OR 0.79, 95% CI 0.64-0.98) and full-fat dairy (OR 0.84, 95% CI 0.71-0.99). The odds of elevated blood pressure were lower by nearly 20% for each daily eating occasion of dairy products.

Summary

A considerable database of observational and clinical trials exists regarding the beneficial effects of dairy food consumption on blood pressure and the risk of hypertension. Prospective and cross-sectional observational studies indicate that dairy food consumption is associated with lower prevalence as well as risk of developing hypertension. The results of randomized controlled clinical trials suggest that the consumption of recommended levels of dairy products can contribute to lower systolic and diastolic blood pressure in individuals with normal and elevated blood pressure. The blood pressure-lowering effect of dairy products is best exemplified by the Dietary Approaches to Stop Hypertension (DASH) clinical trial. This study demonstrated that a low-fat dietary pattern high in fruits and vegetables (8-9 servings/d) and dairy products (~3 servings/d) produced greater reductions in SBP and DBP than either the diet high in only fruits and vegetables or the control diet.

Taken together, these data support the notion of a blood pressure-lowering effect of dairy, and provide strong support for recommending at least 3 servings of dairy foods per day in conjunction with the FGP-recommended numbers of servings of fruits and vegetables for an overall healthy diet.

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Weight Management and Body Composition

Emerging research indicates that dairy products may contribute to body weight regulation through their influence on the ability of adipose tissue to store, mobilize and oxidize depot fat.

Animal Model Studies

Recent studies have used transgenic mice that over-express the agouti gene specifically in adipocytes (aP2-agouti) [50] to assess the impact of increased dairy intake on weight gain, weight loss and body fat alterations [51,52]. Zemel and colleagues [51] evaluated the effects of diets high in sucrose and fat containing graded levels of calcium from $CaCO_3$ or dairy (nonfat dry milk) on body weight and body fat gain for 6 weeks. Compared to a low calcium control diet (0.4%), weight gain was reduced by 26 and 29% in animals consuming 'medium' calcium diets (1.2% wt/wt) from either $CaCO_3$ or from dairy (25% of total dietary protein) respectively ($p<0.04$) without changes in food intake. On a 'high' calcium diet containing 2.4% calcium derived from dairy (50% of total dietary protein), body weight was reduced further by 39% ($p<0.04$).

Total fat pad mass was reduced 36% by all three elevated calcium diets, whereas the reduction in abdominal fat pad mass was greater on the 'medium' and 'high' dairy diets than on the higher $CaCO_3$ diets. Also, core temperature increased about 0.5°C in response to all three higher calcium diets ($p<0.03$). The control low calcium diet caused a 67% reduction in lipolysis while the higher calcium diets stimulated lipolysis by 3.4 to 5.2 fold ($p<0.015$). These data indicate from this transgenic model that increasing dietary calcium attenuates diet-induced adiposity by modulating adipocyte intracellular calcium and thereby coordinately regulating lipogenesis and lipolysis.

In a second study, this same group evaluated the effect of graded levels of calcium from $CaCO_3$ or dairy (nonfat dry milk) on body weight and lipid metabolism in aP2-agouti transgenic mice fed an energy-restricted diet [52]. A low-calcium (0.4% wt/wt) diet ad lib resulted in ≈100% increase in adipocyte calcium levels, a 29% increase in body weight and a doubling of total fat pad mass, whereas the higher calcium diets resulted in a 50% reduction in adipocyte calcium levels ($p<0.001$). Energy restriction of the low-calcium control diet had no effect on adipocyte calcium levels but did result in an 11% decrease in body weight ($p<0.001$). However, greater body weight reductions of 19%, 25%, and 29% were observed in the high $CaCO_3$, medium (1.2% Ca^{++}) and high (2.4% Ca^{++}) dairy diets. Thus, in this animal model, dietary calcium facilitates reduction of adipose tissue mass and body weight by modulating energy metabolism, serving to reduce energy storage and increase thermogenesis.

Human Studies

Epidemiologic studies have identified strong inverse relationships between body weight and dietary calcium and dairy product intake [51, 49, 53, 54]. In their 1984 analysis of the NHANES I database, McCarron et al. [43] reported a statistically significant inverse association between calcium intake and body weight. More recently, this relationship was again identified in analysis of the NHANES III database [51].

Investigating the antihypertensive effect of calcium by increasing its intake from approximately 400 mg to 1000 mg/day with the addition of yogurt to the diets of obese blacks, Zemel et al. [51] observed

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a 4.9 kg reduction in body fat. In a later analysis of the NHANES III database, these investigators found "a profound reduction in the odds of being in the highest quartile of adiposity associated with increases in calcium and dairy product intake." [51]

Although RCT data directly assessing the calcium–weight association are somewhat limited as yet, review of studies in which calcium intake was the independent variable, with bone mass or blood pressure as the outcome variable, confirms the observational reports [55]. In a study of 82 young girls, Cadogan et al. [56] reported the impact on bone mineral acquisition of providing one pint of milk/d for 18 months. Mean calcium intake of the milk group was 1125 mg/d compared to 703 mg/d for the control group. Protein, calcium, phosphorus, magnesium, zinc, riboflavin and thiamine were higher in the milk group at the end of the trial. There was also greater acquisition of bone mineral in the milk-supplemented group; total bone density increased 9.6%, compared to 8.5% in the control group ($p=0.017$). Both groups showed similar increments in height, weight, lean body mass, and fat mass, although the milk group showed non-significant trends toward greater gain in weight and lean body mass and reduction in percentage of body fat. This suggests that the weight gain in the milk group was predominately lean tissue.

Lin et al. [57] examined the effects of calcium intake on changes in body composition during a 2-year exercise intervention in 54 normal-weight young women consisting of three resistance-exercise sessions and one hour of jumping rope per week. Mean calcium intake was 781 mg/d and dairy calcium was 537 mg/d. At the end of 2 years, except for a 0.68 kg increase in lean mass, there were no changes in body composition among exercisers and non-exercisers. Total calcium and dairy calcium per kcal were negatively related to change in body weight and body fat. Thus, as calcium intake per energy intake (mg/kcal) increased, there was a decrease in body weight and body fat. These researchers concluded that the effect of calcium was specific to dairy calcium because total calcium and dairy, when adjusted for energy, predicted changes in body weight and body fat whereas non-dairy calcium did not.

Davies et al. [58] reevaluated five clinical trials originally designed to determine skeletal end points to determine the association of calcium intake and body weight. In this study, BMI and change in body weight were regressed against calcium intake per protein intake. Significant negative slopes of BMI regressed against calcium to protein ratio was found for individual studies and in combined analysis. The pooled slope was -0.186 kg/m^2/mg/g ($p<0.01$). The odds ratio for being overweight for calcium below the median intake was 2.25 ($p<0.02$). These results indicate that a 100-mg increase in calcium intake may result in a 0.82 kg/y decrease in body weight in young women, 0.038 kg/y in middle-aged women, and 0.052 kg/y in older women. Melanson et al. [59] have recently shown, using whole body, indirect calorimetry, that high calcium intake promotes fat oxidation, supporting similar conclusions of Zemel et al. in their animal model [51].

Recent findings in animals and in humans demonstrate that there are greater effects on body weight from dairy-containing foods than might be predicted from their calcium content alone. In the CARDIA trial described above, a consistent reduction in the incidence of obesity was observed in overweight individuals (≥25 kg/m^2) with increasing consumption of dairy foods (p for trend <0.001) [49]. Other components of IRS also were improved by higher dairy intakes including hypertension, abnormal glucose tolerance, and dyslipidemia. The 10-year cumulative incidence of obesity in overweight individuals with the lowest dairy consumption (<1.5 servings/d) was 64.8% compared to

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45.1% in those with the highest dairy consumption (≥5 servings/d). The odds of obesity were considerably reduced with both reduced-fat dairy (OR 0.84, 95% C, 0.70-1.02) and full-fat dairy (OR 0.84, 95% CI 0.73-0.97). The odds of obesity were lower by nearly 20% for each daily eating occasion of total dairy products.

A recent clinical study, published in abstract form [60], compared the relative effects of supplemental calcium and dairy products for 24 wks on weight loss during energy restriction in 32 obese adults. Body weight loss was 26% greater in the supplemental calcium group (1200 - 1300 mg Ca/d), but was 70% greater in subjects consuming identical levels of calcium supplied from 3-4 servings of dairy/d (milk, cheese, yogurt) compared to the low-calcium control group (total calcium intake: 400-500 mg/d) ($p<0.01$). When compared with the low-calcium diet, fat loss (by DEXA) in the high supplemental calcium and high dairy groups was augmented by 38% and 64%, respectively ($p<0.01$). Participants who consumed the high supplemental calcium diet or the high-dairy diet also showed significantly greater ($p<0.001$) fat loss in the trunk areas than did those who consumed the low-calcium diet. These findings are consistent with two other abstract reports by these same authors, one looking at obese African Americans [61] with essentially the same beneficial outcomes in terms of decrease in body fat, trunk fat, and increase in lean mass and the second in obese adults [62]. This latter abstract documented a greatly augmented improvement in waist circumference as well as the other indicators of reduce body fat mass. In all these studies the dietary (dairy) calcium intake in the group of adults experiencing the marked improvement in measures of adiposity was equivalent to 3-4 servings of a dairy products per day.

Summary

Taken together, the available data provide strong support for a beneficial effect of increased dairy foods on body weight and fat loss. Animal studies have demonstrated an important role of increased dairy on decreasing body weight and body fat during over-consumption and during energy restriction. Most observational data and clinical trial results indicate a statistically significant inverse relationship between dairy intake/calcium intake and body weight and body fat loss. Recent clinical studies also have demonstrated that increased body weight/body fat loss, when adequate calcium is provided by supplements, is further augmented by dairy foods, indicating that additional nutrients from dairy foods are playing a role. As recently stated in the proceedings of a symposium on dairy products and weight regulation, if emerging data can be confirmed, "increasing the low dairy product and calcium intakes in the United States may greatly contribute to reducing the growing epidemic of obesity and IRS."[50]

Blood Lipid Effects of Dairy

Daily calcium intake, in which dairy products provided 60% of the total calcium, was negatively correlated with plasma LDL cholesterol (LDL-C), total cholesterol and the ratio of total/HDL cholesterol [54]. In a cross-sectional analysis of NHANES III, dairy product consumption ranging from <1 to >5 servings per day was associated with a modest increase in total and saturated fat intake. However, dairy consumption was not related to plasma LDL-C, TC or triglycerides [63]. In a prospective population-based study that examined the association between dairy intake and the incidence of the Insulin Resistance Syndrome, no association between dairy intake and the incidence of high LDL-C was observed [49].

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Estimated Healthcare Savings Associated With Adequate Dairy Food Intake (Am J Hypertens 2003 [in press].

The economic impact of increasing consumption of dairy products across the population has been addressed in a paper being published late this year in the *American Journal of Hypertension* [64]. Based on several decades of data from prospective longitudinal studies and randomized controlled trials, adequate intake of dairy foods, with their broad complement of essential nutrients, is shown to be a common factor in the reduction of the disease burden of several medical conditions.

The authors of that study searched the medical literature for RCTs and observational and prospective longitudinal studies that assessed: 1) the relationship between dairy calcium or dairy product consumption and the prevalence of these disorders, or 2) the impact on the disorder of an intervention utilizing calcium or dairy intake as a major component of the intervention. They distinguished between observational cross-sectional and prospective longitudinal studies because the latter in many cases were established to study specific conditions, while the former often included multivariate probing expeditions. Annual cost figures for the respective conditions were obtained from recent literature and published data from public and private health organizations. To derive first-year cost savings for each condition, the authors used projections of benefit from clinical outcomes data that were mid-range. It was not possible to estimate year-one cost reductions for all disorders; for stroke, coronary artery disease, and colorectal cancer, the published data do not indicate response times of less than several years.

In addition to those described above, low calcium/dairy intake also is linked to type-2 diabetes, kidney stones, certain outcomes of pregnancy, and some cancers. Summarizing the available evidence of the net benefits of increased dairy food intake on these conditions, their outcomes, and their costs, first- and fifth-year direct healthcare cost savings were conservatively estimated.

The authors estimate that increasing dairy food intake to recommended levels of 3-4 servings per day would be associated with an annual reduction of 5% in the incidence of obesity in Americans, increasing by an additional 5% per year, yielding a 25% reduction at five years. Using that estimate of impact, one-year healthcare savings would approach $2.5 billion and at five years would exceed $37.5 billion.

On the basis of the collective observations for hypertension, the authors project a virtually immediate 40% reduction in the prevalence of mild to moderate hypertension with an increase in dairy product intake to 3-4 servings/d. First-year healthcare cost savings would approach $14 billion, and be sustained for a cumulative savings at five years of $70 billion.

For purposes of this analysis, the authors used a conservative estimate, i.e., a 20% reduction in fracture risk related to dairy intakes that provide, with other food calcium sources, 1000–1500 mg Ca/d. Direct costs for all osteoporotic fractures combined were estimated to be $17 billion for 2002. A 20% reduction translates to $3.5 billion savings each year, achievable by year two of the higher intake, reaching cumulative savings of $14 billion over five years.

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For the other conditions assessed in this study, stroke ($20 b), CAD ($16.5b), type-2 diabetes ($37.5b) nephrolithiasis ($2.5 b), pregnancy ($15b) and colorectal cancer ($0.75b), the five-year savings were equally impressive. This in-press analysis demonstrated that if adult Americans increased their intake of dairy foods to 3-4 servings/d, healthcare savings within the first year would be approximately $26 billion and five-year cumulative savings would exceed $200 billion.

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3. Appropriateness of the proposed *food intake patterns for educating Americans* about healthful eating patterns

Are the proposed intakes of some foods groups or subgroups feasible?
CNPP should be commended for its efforts to educate Americans on healthful eating patterns. The proposed Daily Food Intake Patterns (CNPP-Table 1), while laudable in their attempt to manage calories and meet nutritional goals, should be evaluated more closely to determine their feasibility and the potential public health implications.

- *As stated earlier, the CNPP suggested increased amounts of fruits, dark green vegetables (DGL), dark yellow (DY) vegetables, and legumes (LEG) for the 2200 and 2800 calorie levels are 30 – 50% higher than the current Food Guide Pyramid (FGP) recommendations and 3-4 times higher than what Americans >2 years currently consume. The recommended levels of whole grains (WG)are 4.5 to 5.5 times higher than current consumption.*

In an evaluation report of the 5-A-Day for Better Health program, total vegetable consumption increased by 0.1 and 0.3 servings/day in children and adults respectively, between 1989 and 1996 [16] suggesting small increases in mean vegetable consumption (**Table 2**). National eating trends data between 1995 and 2003 indicate a –16% and –22% reduction in deep yellow and legumes eating occasions and no change in dark green vegetables (**Table 3**) [17]. The average daily consumption of DGL, DY, and LEG is 0.2 servings each, and for WG and RG it is 1.0 and 5.8, respectively.

To meet the current FGP recommendations, the consumption of DGL, DL and LEG need to increase by almost 300%, and for the proposed Daily Food Intake Patterns by 3-4 times (300-400%, @ 2200 calories). for WG, consumption needs to increase by 3.5 times to meet the Daily Food Intake Pattern (@2200 calories).

As pointed out elsewhere in this letter, the high levels of fruits, vegetables and grains recommended by CNPP could actually result in an exacerbation of the calcium crisis in the U.S. It takes 6 – 7 servings of DGL or LEG to equal the calcium content of one serving of milk, not accounting for the potential lower bioavailability [19]. Based on the current trends in consumption, it is highly unlikely that Americans will consume the amount of calcium from fruits, vegetables and whole grains as suggested in Table 5. The result is-----Food Intake Pattern recommendations that end up exacerbating low calcium intake by promoting the intake of foods that are generally poor sources of calcium and have a low probability of consumption, and limiting the intake of excellent calcium sources like low-fat dairy products that have a substantially greater probability of consumption. CNPP should consider Food Intake Pattern recommendations that balance the need for managing calories, while using naturally nutrient dense foods to address critical nutrient needs such as calcium for growth and development.

As previously discussed, the following solutions provide a more practical alternative Food Intake Pattern for CNPP's consideration:

- Use current FGP recommended amounts for: vegetables, fruits and grains.
- Add one additional serving of low-fat/fat-free milk (i.e. 3-4 servings/day).
- Remove one refined grain serving.

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NDC's nutritional assessment of replacing one serving of a refined grain with additional servings from the milk group demonstrated the feasibility of increasing dairy from 2 - 3 servings/day to 3 - 4 servings/day in the diet. This addition resulted in favorable changes in total fat, saturated fat and calories as well as substantial increases in calcium (approximately 302 mg/serving) as well as other nutrients associated with milk including potassium, phosphorus, magnesium, and vitamins A, D, B_{12}, riboflavin and niacin.

Increasing dairy intake is a reasonable and effective proposition to increase the calcium intake of Americans

Milk and other dairy foods are the major source of calcium in the U.S., providing 72% of the calcium available in the food supply [65]. Few other foods provide dairy's concentrated natural source of calcium along with 8 other vitamins and minerals. Without consuming dairy products, it is difficult to meet dietary calcium recommendations [66,67]. In an analysis of food sources of calcium, milk and milk products provided 83% of the calcium in the diets of young children, 77% of the calcium in adolescent females' diets, and between 65% and 72% of the calcium in adults' diets [68]. Albeit, in all groups, especially adolescent females, calcium consumption is substantially below recommended levels.

In 2002, cheese, milk and yogurt accounted for 422 eating occasions compared to 54 for dark green vegetables, deep yellow vegetables and legumes combined [17].

Yogurt volume, although a smaller portion of the total dairy market, showed a 4.7% increase in the last year with low-fat and fat-free products accounting for more than 90% of the total volume.

Improvements to fluid milk in schools can increase consumption by children
During School year 2001/02, NDC sponsored a pilot study designed to improve the attractiveness of fluid milk products offered to students enrolled in public schools [69]. The School Milk Pilot Test (SMPT) was conducted in 146 schools selected from 18 school districts located in different parts of the U.S. in the fall of 2001 [65]. Of the 146 schools, 99 served as 'test' schools and the remaining 47 as 'control' schools. A variety of changes were made in the test schools including:

- Three flavor varieties were offered (white, chocolate, strawberry).
- Quality of chocolate milk was made comparable to retail products.
- Coolers to maintain milk at prescribed temperatures were installed.
- Plastic re-sealable containers were provided.

Student participation in the meal programs and the quantity of milk sales in the pilot schools was gathered daily throughout most of school year 2001/02. A net improvement of 4.4 percent in program participation was observed in test schools at the secondary level, whereas no difference was noted among elementary students. The quantity of milk sold increased measurably in both elementary (+15%) and secondary schools (22%).

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It was found that children's diets were affected by the test in different ways. Some children were attracted to participate in school meals programs who hadn't before. On the basis of the SMPT findings, it was estimated that participation in the school meals program would increase by about 430,000 students if the test measures were adopted nationwide.

Some children who were already participating in the school meals programs, but weren't drinking milk with their meals, were prompted to become milk drinkers. And, finally, some children remained outside the school meals programs but increased their consumption of milk through a la carte or vending machine purchases.

These results demonstrate that milk consumption can be effectively increased when improvements are made to product functionality, packaging and presentation.

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4. **Appropriateness of using "cups"and "ounces" vs. "servings" in consumer materials to suggest daily amounts to choose from each food group and subgroup.**
CNPP points out that, "The proposed patterns in CNPP-Table 1 show both quantity and servings information. However, use of both in consumer materials would be confusing." Also, CNPP indicates, "In addition, it is often difficult to harmonize Pyramid serving sizes with those used by FDA on Nutrition Facts labels."

Serving sizes used in the FGP are, in many cases, different than those used on the Nutrition Facts panel for the same food. For example, the FGP serving size for natural cheese is 1.5 ounces; the serving size used for the Nutrition Facts panel is 1 ounce. The FGP serving size for processed cheese is 2 ounces, while the serving size used for the Nutrition Facts panel is ¾ ounce. Also, the FGP serving size for yogurt is 8 ounces; the serving size used for the Nutrition Facts panel varies from 4 - 8 ounces, with 6 ounces being very common. On the other hand, for numerous food products the FGP serving size is the same as that used on the Nutrition Facts panel (e.g., 1 cup milk). While the purposes of the FGP and Nutrition Facts panel may be different, they are related. Both programs are trying to help educate American consumers about food and nutrition -- the amount of food they should eat and the nutritional content of the food they eat.

Mandatory nutrition labeling of food products, including labeling of serving size, has been in place since 1993. American consumers have become accustomed to reading the Nutrition Facts panel [70]. However, consumers are still unsure how to fully utilize the FGP and nutrition labels. Point-of-purchase information is extremely valuable to consumers to help make informed food/diet choices. Consumers who may mistakenly equate FDA Facts panel servings of dairy products with FGP servings could very easily run the risk of under-consuming critical nutrients such as calcium. Thus, it may be an appropriate time for USDA and FDA to consider harmonizing their respective programs to better serve the American consumer. In an effort to help understand the impact of aligning serving sizes, we have assessed the impact of using serving sizes encountered on the Nutrition Facts panel of dairy products, which we call "marketplace" serving sizes, on achieving dietary recommendations for calcium.

We utilized the FGP analysis of Shaw and colleagues [13] using serving sizes encountered on the Nutrition Facts panel of dairy products rather than FGP servings. To do this we created a nutritional composite for dairy products based on current consumption patterns and current marketplace serving sizes. To calculate a calcium composite for a dairy serving we used the percentage of milk, cheese and yogurt consumed (data from USDA ERS) and adjusted the composite based on the actual consumption of various types milk (full fat, low fat, and skim), cheese (processed versus natural) and yogurt (8 oz versus 6 oz). The dairy composite for calcium is presented in **Table 10**. The average composite dairy product contained 247 mg calcium per marketplace serving. The calcium content of the average marketplace serving of dairy is considerably lower than the 302 mg calcium per FGP dairy serving. This is partly due to the lower calcium content of natural and processed cheese and to the increased presence of 6 oz containers of yogurt (which are labeled as one serving under FDA labeling rules).

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We then replicated the approach taken by Shaw et al [13] to estimate calcium intake using the new marketplace serving size dairy composite. When we used the FGP dietary patterns to calculate non-dairy calcium intake and added 2-4 marketplace servings of dairy, we found that at least 3 servings, and for most age/gender groups 4 marketplace servings of dairy products would be needed to meet the calcium AI (**Table 11**). For example, in females, adding 2 marketplace servings of dairy products to the non-dairy calcium provided by other foods recommended by the FGP only provided 60-78% of the AI for calcium. Three servings of marketplace dairy products raised the calcium intake to 79-103% of the AI for calcium but 9-18 year olds and those older than 50 years of age needed 4 marketplace servings to meet or exceed 100% of the AI for calcium. In those consuming pattern B (2200 kcal/day), all those aged 9 years and older needed at least three marketplace dairy servings to meet the AI for calcium. With four marketplace servings almost all groups, regardless of age or dietary pattern, met or exceeded the AI for calcium.

When we used actual food consumption data from NHANES IV to estimate the non-dairy calcium intake and added 2-4 marketplace servings of dairy products (**Table 12**), we concluded that 3-4 marketplace servings of dairy products are necessary to meet or exceed the AI for calcium. In 9-18 year olds, 3 marketplace servings of dairy products provided 78% of the AI for calcium in females and 79-86% of the AI for calcium in males. Additionally, in those older than 50 years of age, 3 marketplace servings of dairy products provided 82-93% of the AI for calcium. Four marketplace servings of dairy products helped these age groups approach or exceed that AI for calcium.

Summary

We have shown for dairy products, changing to serving sizes used on the Nutrition Facts panel would require the dairy serving recommendation to increase from 2-3 servings per day to at least 3-4 servings per day for individuals to meet 100% of the AI for calcium. Four servings of dairy products are particularly necessary for those 9-18 years of age and those 51+ years of age, when we factor in actual non-dairy calcium intake. Consumers who may mistakenly equate FDA Facts panel servings of dairy products with FGP servings could very easily run the risk of under-consuming critical nutrients such as calcium as well as other essential nutrients.

It may be an appropriate time for the USDA to seriously consider ways to harmonize the FGP servings sizes to those required by the FDA on the Nutrition Facts panel and to be consistent with serving sizes that consumers encounter in the marketplace. While this may cause a realignment of the number of servings of various foods, we believe the effort is worthwhile, since consumers will then be able to link the FGP recommendations with product labels. CNPP should consider this opportunity to make the FGP more consumer-friendly by providing recommendations in units that can be easily obtained in grocery stores.

Research contained in this letter has clearly demonstrated that 3 – 4 servings of dairy per day are necessary for Americans to achieve the calcium AI using either FGP servings or FDA Facts panel servings. In light of the calcium crisis in the U.S. as well as the obesity imperative in which 3 – 4 servings of dairy products per day are emerging as a potential solution, increasing the recommended servings of dairy from 2 – 3 per day to 3 – 4 servings per day has substantial scientific support and public health benefit.

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5. *Selection of appropriate illustrative food patterns* for various consumer materials.
The CNPP has requested comments on the selection of smaller subsets of the food patterns for use in the development of consumer materials.

NDC suggests that the criteria used for the selection of illustrative patterns should be those that would be most impactful and reflective of the general population, including caloric levels. NDC notes that the caloric levels that are reasonable and have familiarity with consumers are those that are used as the basis for the DRV's on the FDA Nutrition Facts Panel: 2000 calories and 2500 calories. These caloric levels are consistent with widely used food plans and 2000 calories approximates the caloric requirements for postmenopausal women who are at-risk for excessive intake of calories and fat. NDC encourages CNPP to choose a caloric pattern(s) that is reasonable, actionable, and consistent with what consumers are encountering in the marketplace.

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TABLE 1.

Calcium Provided by Non-dairy Food Guide Sources[1]

Ages	Calcium DRI mg/day	Non-Dairy Calcium, mg/day[2]	Percentage of DRI (2 dairy)	(3 dairy)	(4 dairy)
Females					
1-3 years	500	191.6	159	220	280
4-8 years	800	226.3	104	142	179
9-13 years	1300	273.5	**68**	**91**	114
14-18 years	1300	273.9	**68**	**91**	114
19-30 years	1000	296.2	**90**	120	150
31-50 years	1000	312.5	**92**	122	152
51-70 years	1200	283.5	**74**	**99**	124
>70 years	1200	238.7	**70**	**95**	121
Males					
1-3 years	500	216.7	164	225	285
4-8 years	800	286.1	111	149	187
9-13 years	1300	283.6	**68**	**92**	115
14-18 years	1300	381.9	**76**	**99**	122
19-30 years	1000	404.7	**101**	131	161
31-50 years	1000	423.5	**103**	133	163
51-70 years	1200	377.2	**82**	107	132
>70 years	1200	312.3	**76**	102	127

[1]Food Guide Pyramid dairy serving defined as 302 mg/serving.

[2]Non-dairy calcium intake calculated from NHANES IV.

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TABLE 2.

Food Guide Pyramid
Review of 5-Day Program

		Fruit[a]		Vegetables[a]		Total Vegetables and Fruit[a]	
		1989-1991	1994-1996	1989-1991	1994-1996	1989-1991	1994-1996
Total Age	Total (2+ yrs)	1.3± 0.03[b]	1.5 ± 0.03			4.5 ± 0.06	4.9 ± 0.05
2-19 yrs		1.3 ± 0.06	1.6 ± 0.05			4.0 ± 0.09	4.3 ± 0.08
20+ yrs		1.3 ± 0.04	1.5 ± 0.03			4.6 ± 0.06	5.2 ± 0.05

[redacted]

[a] Includes all forms, including condiments, candy, chips, and french fries.
[b] Mean standard error, adjusted to be representative of the U.S. population during the years of each survey.

[redacted]

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TABLE 3.**

NPD/NET IN-HOME CONSUMPTION*

Two Years Ending Feb.	1995	1996	1997	1998	1999	2000	2001	2002	2003	1995-2003 Actual Change
DARK GREEN	20.9	20.7	20.0	19.4	19.8	20.3	19.5	19.0	20.9	0.0
BROCCOLI	13.2	12.6	12.1	11.5	11.7	12.1	11.5	11.0	11.9	-1.3
SPINACH	4.1	4.3	3.9	3.6	3.7	3.9	4.2	4.0	3.8	-0.3
ROMAINE	2.4	2.2	2.4	3.0	3.5	3.4	3.2	3.3	4.7	2.3
COLLARD GREENS	1.5	1.7	1.8	1.5	1.3	1.2	1.1	1.2	1.2	-0.3
DEEP YELLOW	36.3	34.6	34.9	35.1	33.8	32.4	31.0	29.8	30.5	-5.8
CARROTS	30.3	29.3	29.8	30.0	28.8	27.5	26.1	25.0	25.9	-4.4
WINTER SQUASH	1.0	0.7	0.6	0.8	0.8	0.7	0.8	0.8	0.5	-0.5
SWEET POTATOES	4.5	4.2	4.1	3.9	3.8	3.8	3.6	3.7	3.7	-0.8
PUMPKIN	0.5	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.3	-0.2
LEGUMES	5.8	6.0	6.3	5.4	5.5	5.5	5.1	4.7	4.5	-1.3
PINTO BEANS	3.0	3.0	3.3	3.1	3.1	3.0	2.7	2.4	2.2	-0.8
KIDNEY/RED BEANS	2.6	2.8	2.6	2.0	2.0	2.2	2.1	2.0	2.0	-0.6
GARBANZO BEANS/CHICKPEAS	0.4	0.4	0.5	0.4	0.4	0.5	0.4	0.4	0.4	0.0

*Measured as an eating occasion, not volume
Includes eatings 'as is' and ingredient use
Measure = annual eatings per capita

**From: The NPD Group, Inc. 2003
National Eating Trends, In Home Consumption

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Table 4a
Adding One Additional Dairy Serving
Example of Food Guide Pyramid Menu
(1,600 calories)

FOOD GUIDE PYRAMID 1,600 CALORIE MENU, DAY 1*								
Item	**Bread**	**Vegetable**	**Fruit**	**Milk**	**Meat Oz.**	**Fat Grams**	**Saturated Fat Grams**	**Calories**
BREAKFAST								
Orange juice, 3/4 cup			1			trace		84
Oatmeal, 1/2 cup	1					1		73
Remove → ~~White toast, 1 slice~~	~~1~~					~~1~~	~~.2~~	~~69~~
Remove → ~~Soft margarine, 1 teaspoon~~						~~4~~	~~.6~~	~~34~~
Add → **Non-fat yogurt**						**.4**	**.2**	**98**
Jelly, 1 teaspoon						trace		16
Skim milk, 1/2 cup				1-1/2		trace		43
LUNCH								
*Split pea soup, 1 cup split peas and ham carrots and onions		1/2			1-1/4	2		218
*Quick tuna and sprouts sandwich tuna whole-wheat sandwich roll	2				1-1/2	4		202
Mixed greens salad, 1 cup		1				trace		9
Reduced-calorie Italian dressing 1 tablespoon						1		16
*Chocolate mint pie, 1 serving	1/2			1/4		6		176
DINNER								
*Savory sirloin, 3 ounces					3	5		129
*Corn and zucchini combo, 1/2 cup		1				2		76
Tomato and lettuce salad, 1 serving Medium tomato, 1 lettuce leaf		1				trace		27
Reduced-calorie French dressing 1 tablespoon						1		22
Small whole-wheat roll	1					1		72
Soft margarine, 1 teaspoon						4		34
*Yogurt-strawberry parfait, 1 cup lowfat frozen yogurt strawberries			1	1/2		2		128
SNACKS								
Graham crackers, 3 squares	1					2		81
Skim milk, 1 cup				1		trace		85
TOTAL	~~6-1/2~~ **5-1/2**	3-1/2	2	~~2-1/4~~ **3-1/4**	5-3/4	~~36~~ **31.4**	~~8.7~~ **8.1**	~~1,594~~ **1,589**

*From: Using the Food Guide Pyramid: A Resource for Nutrition Educators. U.S. Department of Agriculture: Food, Nutrition, and Consumer Services, Center for Nutrition Policy and Promotion.

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Table 4b
Adding One Additional Dairy Serving
Food Guide Pyramid Menu Example
(1,600 calories)

FOOD GUIDE PYRAMID 1,600 CALORIE MENU, DAY 2*								
Item	**Bread**	**Vegetable**	**Fruit**	**Milk**	**Meat Oz.**	**Fat Grams**	**Saturated Fat Grams**	**Calories**
BREAKFAST								
Grapefruit juice, 3/4 cup			1			trace		70
* Breakfast pita, 1 serving 4-inch whole wheat pita vegetables egg	1	1/4			1/2	6		171
Skim milk, 1 cup				1		trace		86
LUNCH								
*Turkey pasta salad, 1 serving macaroni red grapes turkey	1		1/2		2	6		264
Tomato wedges, lettuce leaf		1				trace		27
Small hard roll	1					1		78
Soft margarine, 1 teaspoon						4		34
Skim milk, 1 cup				1		trace		86
DINNER								
* Creole fish fillets, 1 serving cod vegetables		1			3	1		131
Small new potatoes with skin, 2		1				trace		68
Cooked green peas, 1/2 cup with soft margarine, 1 teaspoon		1				trace 4		67 34
* Whole-wheat cornmeal muffins	2					4		129
Soft margarine, 1 teaspoon						4		34
* Peach crisp, 1/2 cup rolled oats and flour frozen peaches	1/2		3/4			4		153
SNACKS								
Change→ ~~1~~ 1/2 Medium bagel	1~~-2~~					0.5 ~~1~~	.05 ~~.1~~	77 ~~153~~
Remove→ ~~Soft margarine, 1 teaspoon~~						~~4.0~~	~~0.6~~	~~34~~
Add→ Jelly, 1 teaspoon						trace		16
Skim chocolate milk, 1 cup				1		.2	.1	139
TOTAL	~~7-1/2~~ 6-1/2	4-1/4	2-1/4	~~2~~ 3	5-1/2	~~39~~ 38.2	~~8~~ 6.9	~~1,635~~ 1,664

*From: Using the Food Guide Pyramid: A Resource for Nutrition Educators. U.S. Department of Agriculture: Food, Nutrition, and Consumer Services, Center for Nutrition Policy and Promotion.

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Table 4c
Adding One Additional Dairy Serving
Food Guide Pyramid Menu Example
(1,600 calories)

FOOD GUIDE PYRAMID 1,600 CALORIE MENU, DAY 3*								
Item	Bread	Vegetable	Fruit	Milk	Meat Oz.	Fat Grams	Saturated Fat Grams	Calories
BREAKFAST								
Medium grapefruit, 1/2			1			trace		41
Ready-to-eat cereal flakes, 1 ounce	1					trace		111
Toasted raisin English muffin, 1/2	1					1		69
Jelly, 1 teaspoon						trace		16
Skim milk, 1/2 cup				1/2		trace		43
LUNCH								
*Taco salad, 1 serving unsalted tortilla chips tomato puree and greens lowfat, low-sodium cheddar cheese beef and bean	3/4	1-1/2		1/2	2-1/2	19		455
Sherbet, 1/2 cup						2		135
DINNER								
* Pork and vegetable stir-fry, 1 serving rice vegetables pork	1-1/2	1			3	9		370
Cooked broccoli, 1/2 cup		1				trace		26
Remove→ ~~Small white roll~~	~~1~~					~~2~~	~~1~~	~~83~~
Add→ Skim milk, 1 cup				1		.2	.1	85
Minted pineapple chunks, juice-pack, 1/2 cup			1			trace		75
SNACKS								
Wheat crackers, 6	1					4		86
Skim milk, 1 cup				1		trace		85
TOTAL	~~6-1/4~~ 5-1/4	3-1/2	2	~~2~~ 3	5-1/2	~~37~~ 35.2	12	~~1,595~~ 1,597

*From: Using the Food Guide Pyramid: A Resource for Nutrition Educators. U.S. Department of Agriculture: Food, Nutrition, and Consumer Services, Center for Nutrition Policy and Promotion.

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Table 4d
Adding One Additional Dairy Serving
Food Guide Pyramid Menu Example
(1,600 calories)

FOOD GUIDE PYRAMID 1,600 CALORIE MENU, DAY 4*								
Item	Bread	Vegetable	Fruit	Milk	Meat Oz.	Fat Grams	Saturated Fat Grams	Calories
BREAKFAST								
Fresh sliced strawberries, 1/2 cup			1			trace		25
Whole grain cereal flakes, 1 ounce	1					trace		99
Remove→ ~~Medium toasted plain bagel, 1/2~~	~~1~~					~~trace~~	~~.05~~	~~74~~
Remove→ ~~Cream cheese, 1/2 tablespoon~~						~~3~~	~~1.6~~	~~25~~
Add→ Non-fat yogurt, 1 cup				1		.4	.2	98
2% fat milk, 1 cup				1		5		122
LUNCH								
* Broiled chicken fillet sandwich chicken whole-wheat roll tomato slice lettuce leaf	2				2	9		315
Mayonnaise, 1 packet						8		72
* Confetti coleslaw, 1/2 cup		1				trace		36
2% fat milk, 1 cup				1		5		122
DINNER								
* Lentil stroganoff, 1 serving noodles lentils vegetables, cut yogurt	1-1/2	1-1/4		1/4	2	5		520
Cooked whole green beans, 1/2 cup		1				trace		22
Tomato and cucumber salad Tomato, cucumber, lettuce leaf	1					trace		17
Reduced-calorie vinaigrette dressing, 1 tablespoon						1		16
Medium honeydew melon, 1/8			1			trace		44
SNACKS								
* Roast beef sandwich, 1/2 roast beef whole-wheat bread lettuce leaf mustard, 1 teaspoon	1				1	3		116
TOTAL	~~6-1/2~~ 5-1/2	~~4~~-1/4	2	~~2-1/4~~ 3-1/4	5	~~39~~ 36	~~13~~ 11.5	~~1,625~~ 1,624

*From: Using the Food Guide Pyramid: A Resource for Nutrition Educators. U.S. Department of Agriculture: Food, Nutrition, and Consumer Services, Center for Nutrition Policy and Promotion.

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Table 4e
Adding One Additional Dairy Serving
Food Guide Pyramid Menu Example
(1,600 calories)

FOOD GUIDE PYRAMID 1,600 CALORIE MENU, DAY 5*								
Item	**Bread**	**Vegetable**	**Fruit**	**Milk**	**Meat Oz.**	**Fat Grams**	**Saturated Fat Grams**	**Calories**
BREAKFAST								
Medium cantaloupe, 1/4			1			trace		48
* Whole-wheat pancakes, 2	2					4		172
* Blueberry sauce, 1/4 cup			1/3			trace		33
Skim milk, 1 cup				1		trace		86
LUNCH								
* Chili-stuffed baked potato medium potato tomato sauce beef and beans		1 1/2			2-1/2	9		397
* Spinach-orange salad, 1 cup spinach chopped vegetables orange sections and juice		1 1/2	1/2			7		108
Remove→ ~~Wheat crackers, 6~~	~~1~~					~~4~~	~~1~~	~~86~~
Add→ Skim milk, 1 cup				1		.2	.1	85
DINNER								
* Apricot-glazed chicken, 1 serving chicken apricots, raisins, and orange juice			1/2		3	2		212
*Rice-pasta pilaf, 3/4 cup	1-1/2	1/4				5		203
Tossed salad, 1 cup		1				trace		13
Reduced-calorie Italian dressing, 1 tablespoon						1		16
Small hard roll	1					1		78
Vanilla ice milk, 1/2 cup				1/3		3		91
SNACKS								
Fig bar, 1	1/2					1		57
Skim milk, 3/4 cup				3/4		trace		64
TOTAL	~~6~~ 5	4-1/4	2-1/3	~~2~~ 3	5-1/2	~~37~~ 33.2	~~11~~ 10.1	~~1,664~~ 1,663

*From: Using the Food Guide Pyramid: A Resource for Nutrition Educators. U.S. Department of Agriculture: Food, Nutrition, and Consumer Services, Center for Nutrition Policy and Promotion.

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Table 5a
Adding One Additional Dairy Serving
Food Guide Pyramid Menu Example
(2,200 calories)

FOOD GUIDE PYRAMID 2,200 CALORIE MENU, DAY 2*								
Item	**Bread**	**Vegetable**	**Fruit**	**Milk**	**Meat Oz.**	**Fat Grams**	**Saturated Fat Grams**	**Calories**
BREAKFAST								
Grapefruit juice, 3/4 cup			1			trace		70
* Breakfast pita, 1 serving 4-inch whole wheat pita vegetables egg	1	1/4			1/2	6		171
2% fat milk, 1 cup				1		5		122
LUNCH								
*Turkey pasta salad, 1 serving macaroni red grapes turkey	1		1/2		2	6		264
Tomato wedges, lettuce leaf		1				trace		27
Small hard roll, 2	2					2		156
Soft margarine, 2 teaspoons						8		68
Small oatmeal cookies, 4	1					5		109
2% fat milk, 1 cup				1		5		122
DINNER								
* Creole fish fillets, 1-1/3 serving cod vegetables		1-1/3			4	2		175
Small new potatoes with skin, 2		1				trace		68
Cooked green peas, 1/2 cup with soft margarine, 1 teaspoon		1				trace 4		67 34
* Whole-wheat cornmeal muffins, 2	4					9		259
Soft margarine, 2 teaspoons						8		68
* Peach crisp, 1/2 cup rolled oats and flour frozen peaches	1/2		3/4			4		153
SNACKS								
Remove→ ~~Medium bagel~~	~~2~~					~~1~~	~~1~~	~~153~~
Remove→ ~~Soft margarine, 2 teaspoons~~						~~8~~	~~1.2~~	~~68~~
Add→ Small fresh pear			1			1		82
Skim chocolate milk, 1 cup				1		.2	.1	139
TOTAL	~~7-1/2~~ 6-1/2	4-1/4	2-1/4	~~2~~ 3	5-1/2	~~39~~ 38.2	~~8~~ 6.9	~~1,635~~ 1,664

*From: Using the Food Guide Pyramid: A Resource for Nutrition Educators. U.S. Department of Agriculture: Food, Nutrition, and Consumer Services, Center for Nutrition Policy and Promotion.

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Table 5b
Adding One Additional Dairy Serving
Food Guide Pyramid Menu Example
(2,200 calories)

FOOD GUIDE PYRAMID 2,200 CALORIE MENU, DAY 3*								
Item	Bread	Vegetable	Fruit	Milk	Meat Oz.	Fat Grams	Saturated Fat Grams	Calories
BREAKFAST								
Medium grapefruit, 1/2			1			trace		41
Medium Banana			1			1		108
Ready-to-eat cereal flakes, 1 ounce	1					trace		111
Toasted raisin English muffin, 1/2	1					1		69
Soft margarine, 2 teaspoons						8		68
Skim milk, 1/2 cup				1/2		trace		43
LUNCH								
*Taco salad, 1 serving unsalted tortilla chips tomato puree and greens low-fat, low-sodium cheddar cheese beef and bean	3/4	1-1/2		1/2	2-1/2	19		455
Medium gingersnaps, 2	1					2		101
DINNER								
* Pork and vegetable stir-fry, 1 serving rice vegetables pork	1-1/2	1			3	9		370
Cooked broccoli, 1/2 cup		1				trace		26
Change→ Small white roll, ~~2~~ 1	~~2~~ 1					~~3~~ 1.5		~~167~~ 84
Change→ Soft margarine, ~~2~~ 1 teaspoon						~~8~~ 4	~~1.20~~ .6	~~68~~ 34
Add→ Skim milk, 1 cup				1		.2	.1	85
Minted pineapple chunks, juice-pack, 1/2 cup			1			trace		75
SNACKS								
Wheat crackers, 6	1					4		86
Cheddar cheese, 1-1/2 ounces				1		14		171
Turkey sandwich, 1/2 Rye bread turkey lettuce leaf mayonnaise-type salad dressing, reduced calorie, 1/2 tablespoon	1				1	4		137
No-salt-added tomato juice, 3/4 cup		**1**				**trace**		**31**
TOTAL	**~~10~~- ~~1/4~~ 9-1/4**	**4-1/2**	**3**	**~~2~~ 3**	**6-1/2**	**~~73~~ 67.7**	**~~25~~ 24.5**	**~~2,196~~ 2,163**

*From: Using the Food Guide Pyramid: A Resource for Nutrition Educators. U.S. Department of Agriculture: Food, Nutrition, and Consumer Services, Center for Nutrition Policy and Promotion.

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Table 5c
Adding One Additional Dairy Serving
Food Guide Pyramid Menu Example
(2,200 calories)

FOOD GUIDE PYRAMID 2,200 CALORIE MENU, DAY 4*								
Item	Bread	Vegetable	Fruit	Milk	Meat Oz.	Fat Grams	Saturated Fat Grams	Calories
BREAKFAST								
Fresh sliced strawberries, 1/2 cup			1			trace		25
Whole grain cereal flakes, 1 ounce	1					trace		99
Change→ Medium toasted plain bagel, ~~1~~ 1/2	~~2~~ 1					~~1~~ .5	trace	~~149~~ 75
Change→ Cream cheese, ~~1~~ 1/2 tablespoon						~~5~~ 2.5	~~3.2~~ 1.6	~~51~~ 25
2% fat milk, 1 cup				1		5		122
LUNCH								
* Broiled chicken fillet sandwich chicken whole-wheat roll tomato slice lettuce leaf	2				2	9		315
Mayonnaise, 1 packet						8		72
* Confetti coleslaw, 1/2 cup		1				trace		36
Medium fresh orange			1			trace		62
2% fat milk, 1 cup				1		5		122
DINNER								
* Lentil stroganoff, 1 serving noodles lentils vegetables, cut yogurt	1-1/2	1-1/4		1/4	2	5		520
Cooked whole green beans, 1/2 cup with soft margarine, 1 teaspoon		1				trace 4		22 34
Tomato and cucumber salad Tomato, cucumber, lettuce leaf	1					trace		17
Reduced-calorie vinaigrette dressing, 1 tablespoon						1		16
Small pumpernickel roll	1					1		78
Soft margarine, 1 teaspoon						4		34
Medium honeydew melon, 1/8			1			trace		44
Add→ Skim milk, 1 cup				1		.2	.1	85
SNACKS								
No-salt added vegetable juice, 3/4 cup		1				trace		34
* Roast beef sandwich roast beef whole-wheat bread lettuce leaf mustard, 1 teaspoon	2				2	5		227
2% fat milk, 1 cup				1		5		122
TOTAL	~~9 1/2~~ ~~8~~ 1/2	5-1/4	3	~~3 1/4~~ ~~4~~ 1/4	6	~~58~~ 55.2	~~20~~ 18.5	~~2,201~~ 2,186

*From: Using the Food Guide Pyramid: A Resource for Nutrition Educators. U.S. Department of Agriculture: Food, Nutrition, and Consumer Services, Center for Nutrition Policy and Promotion.

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Table 5d
Adding One Additional Dairy Serving
Food Guide Pyramid Menu Example
(2,200 calories)

FOOD GUIDE PYRAMID 2,200 CALORIE MENU, DAY 5*								
Item	**Bread**	**Vegetable**	**Fruit**	**Milk**	**Meat Oz.**	**Fat Grams**	**Saturated Fat Grams**	**Calories**
BREAKFAST								
Medium cantaloupe, 1/4			1			trace		48
* Whole-wheat pancakes, 2	2					4		172
* Blueberry sauce, 1/4 cup			1/3			trace		33
Soft margarine, 1 teaspoon						4		34
Turkey patty, 1 serving					1-1/2	6		123
Skim milk, 1 cup				1		trace		86
LUNCH								
* Chili-stuffed baked potato medium potato tomato sauce beef and beans		1 1/2			2-1/2	9		397
Low-fat, low-sodium cheddar cheese 3 tablespoons				1/3		1		36
* Spinach-orange salad, 1 cup spinach chopped vegetables orange sections and juice		1 1/2	1/2			7		108
Wheat crackers, 6	1					4		86
Skim milk, 1 cup				1		.2	0.1	85
DINNER								
* Apricot-glazed chicken, 1 serving chicken apricots, raisins, and orange juice			1/2		3	2		212
*Rice-pasta pilaf, 3/4 cup	1-1/2	1/4				5		203
Tossed salad, 1 cup		1				trace		13
Reduced-calorie Italian dressing, 1 tablespoon						1		16
Small hard roll, 2	2					2		156
Soft margarine, 2 teaspoons						8		68
Vanilla ice milk, 1/2 cup				1/3		3		91
SNACKS								
Remove→ ~~Large soft pretzel~~	~~2 1/2~~					~~2~~	~~0.4~~	~~190~~
Medium apple, 1/2			1/2			trace		41
Add→ **Non-fat yogurt, 1 cup**				1		.2	0.1	98
TOTAL	~~8~~ 7-1/2	~~4~~-1/4	2-3/4	~~2-2/3~~ 3-2/3	7	~~58~~ 56.2	~~17~~ 16.7	~~2,199~~ 2,107

*From: Using the Food Guide Pyramid: A Resource for Nutrition Educators. U.S. Department of Agriculture: Food, Nutrition, and Consumer Services, Center for Nutrition Policy and Promotion.

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Table 6a
Adding One Additional Dairy Serving
Example of Food Guide Pyramid Menu
(2,800 calories)

FOOD GUIDE PYRAMID 2,800 CALORIE MENU, DAY 1*								
Item	Bread	Vegetable	Fruit	Milk	Meat Oz.	Fat Grams	Saturated Fat Grams	Calories
BREAKFAST								
Orange juice, 3/4 cup			1			trace		84
Oatmeal, 1/2 cup	1					1		73
Remove → ~~White toast, 1 slice~~	~~1~~					~~1~~	~~.2~~	~~69~~
Remove → ~~Soft margarine, 1 teaspoon~~						~~4~~	~~.6~~	~~34~~
Add → **Non-fat yogurt**						**.4**	**.2**	**98**
Jelly, 1 teaspoon						trace		16
Skim milk, 1/2 cup				1-1/2		trace		43
LUNCH								
*Split pea soup, 1 cup split peas and ham carrots and onions		1/2			1-1/4	2		218
*Quick tuna and sprouts sandwich tuna whole-wheat sandwich roll	2				1-1/2	4		202
Mixed greens salad, 1 cup		1				trace		9
Reduced-calorie Italian dressing 1 tablespoon						1		16
*Chocolate mint pie, 1 serving	1/2			1/4		6		176
DINNER								
*Savory sirloin, 3 ounces					3	5		129
*Corn and zucchini combo, 1/2 cup		1				2		76
Tomato and lettuce salad, 1 serving Medium tomato, 1 lettuce leaf		1				trace		27
Reduced-calorie French dressing 1 tablespoon						1		22
Small whole-wheat roll	1					1		72
Soft margarine, 1 teaspoon						4		34
*Yogurt-strawberry parfait, 1 cup lowfat frozen yogurt strawberries			1	1/2		2		128
SNACKS								
Graham crackers, 3 squares	1					2		81
Skim milk, 1 cup				1		trace		85
TOTAL	~~6-1/2~~ 5-1/2	3-1/2	2	~~2-1/4~~ 3-1/4	5-3/4	~~36~~ 31.4	~~8.7~~ 8.1	~~1,594~~ 1,589

*From: Using the Food Guide Pyramid: A Resource for Nutrition Educators. U.S. Department of Agriculture: Food, Nutrition, and Consumer Services, Center for Nutrition Policy and Promotion.

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Table 6b
Adding One Additional Dairy Serving
Food Guide Pyramid Menu Example
(2,800 calories)

FOOD GUIDE PYRAMID 2,800 CALORIE MENU, DAY 2*								
Item	Bread	Vegetable	Fruit	Milk	Meat Oz.	Fat Grams	Saturated Fat Grams	Calories
BREAKFAST								
Grapefruit juice, 3/4 cup			1			trace		70
* Breakfast pita, 1 serving 4-inch whole wheat pita vegetables egg	1	1/4			1/2	6		171
Large bran muffin	1-1/2					7		173
Soft margarine, 1 teaspoon						4		34
2% fat milk, 1 cup				1		5		122
LUNCH								
*Turkey pasta salad, 1 serving macaroni red grapes turkey	1		1/2		2	6		264
Tomato wedges, lettuce leaf		1				trace		27
Small hard roll, 2	2					2		156
Soft margarine, 2 teaspoons						8		68
Medium tangerine			1			trace		37
Small oatmeal cookies, 6	1-1/2					7		164
2% fat milk, 1 cup				1		5		122
DINNER								
* Creole fish fillets, 1-1/3 serving cod vegetables		1-1/3			4	2		175
Small new potatoes with skin, 2		1				trace		68
Cooked green peas, 3/4 cup with soft margarine, 1 teaspoon		1-1/2				trace 4		101 34
* Whole-wheat cornmeal muffins, 2	4					9		259
Soft margarine, 1 teaspoons						4		34
* Peach crisp, 1/2 cup rolled oats and flour frozen peaches	1/2		3/4			4		153
SNACKS								
Change→ Medium bagel, ~~1~~ 1/2	~~2~~ 1					~~1~~ .5	~~.1~~	~~153~~ 77
Change→ Soft margarine, ~~2~~ 1 teaspoons						~~8~~ 4	~~1.2~~ .6	~~68~~ 34
Change→ Jelly, ~~2~~ 1 teaspoon						trace		~~32~~ 16
Small fresh pear			1			1		82
Low-fat fruit flavored yogurt, 1/2 cup				1/2		1		125
Unsalted, roasted peanuts, 2-1/2 tablespoons (1/2 oz.)					1/2	11		132
Add→ Skim chocolate milk, 1 cup				1		.2	.1	139
TOTAL	~~13 1/2~~ 12-1/2	5	~~4-1/4~~	~~2 1/2~~ 3-1/2	7	~~95~~ 90.5	~~23~~ 22.4	~~2,824~~ 2,836

*From: Using the Food Guide Pyramid: A Resource for Nutrition Educators. U.S. Department of Agriculture: Food, Nutrition, and Consumer Services, Center for Nutrition Policy and Promotion.

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Table 6c
Adding One Additional Dairy Serving
Example of Food Guide Pyramid Menu
(2,800 calories)

FOOD GUIDE PYRAMID 2,800 CALORIE MENU, DAY 3								
Item	Bread	Vegetable	Fruit	Milk	Meat Oz.	Fat Grams	Saturated Fat Grams	Calories
BREAKFAST								
Medium grapefruit, 1/2			1			trace		41
Medium banana			1			1		108
Ready-to-eat cereal flakes, 1 ounce	1					trace		111
Toasted raisin english muffin	2					1		138
Soft margarine, 2 teaspoons						8		68
Skim milk, 1 cup				1		trace		86
LUNCH								
*Taco salad, 1 serving unsalted tortilla chips tomato sauce and greens lowfat, low-sodium cheddar cheese beef and beans	3/4	1-1/2		1/2	2-1/2	19		455
Sherbet, 1/2 cup						2		135
Medium gingersnaps, 3	1-1/2					3		151
Skim milk, 1 cup				1		trace		86
DINNER								
*Pork and vegetable stirfry, 1 serving rice vegetables pork	1-1/2	1			3	9		370
Cooked broccoli, 1 cup		2				1		52
Small white rolls, 2	2					3		167
Soft margarine, 2 teaspoons						8		68
Minted pineapple chunks, juice-pack, 1/2 cup			1			trace		75
SNACKS								
Remove → ~~Wheat crackers, 6~~	~~1~~					~~4~~	~~1~~	~~86~~
Add → **Skim chocolate milk, 1 cup**				1		0.2	0.1	139
Orange juice, 3/4 cup			1			trace		84
Cheddar cheese, 1-1/2 oz.				1		14		171
Turkey sandwich rye bread turkey lettuce leaf mayonnaise-type salad dressing, reduced calorie, 1 tablespoon	2				2	9		275
Raw vegetables broccoli florets, 2 cauliflower florets, 2 medium carrot sticks, 2		1				trace		16
Spinach dip (lowfat, yogurt base), 2 tablespoons						2		40
TOTAL	~~11-3/4~~ 10-3/4	5-1/2	4	~~3-1/2~~ 4-1/2	7-1/2	~~84~~ 80.2	~~28.2~~ 27.3	~~2,783~~ 2,836

*From: Using the Food Guide Pyramid: A Resource for Nutrition Educators. U.S. Department of Agriculture: Food, Nutrition, and Consumer Services, Center for Nutrition Policy and Promotion.

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Table 6d

Adding One Additional Dairy Serving Food Guide Pyramid Menu Example (2,800 calories)

FOOD GUIDE PYRAMID 2,800 CALORIE MENU, DAY 4*								
Item	Bread	Vegetable	Fruit	Milk	Meat Oz.	Fat Grams	Saturated Fat Grams	Calories
BREAKFAST								
Fresh sliced strawberries, 1/2 cup			1			trace		25
Hard cooked egg, 1					1	5		74
Whole grain cereal flakes, 1 ounce	1					trace		99
Medium toasted plain bagel	2					1		149
Cream cheese, 2 tablespoon						10		101
2% fat milk, 1 cup				1		5		122
LUNCH								
* Broiled chicken fillet sandwich chicken whole-wheat roll tomato slice lettuce leaf	2				2	9		315
Mayonnaise, 1 packet						8		72
* Confetti coleslaw, 1/2 cup		1				trace		36
Medium fresh orange			1			trace		62
Remove→ ~~* Lemon pound cake, 1 slice~~	~~3/4~~					8	~~5.8~~ 1	~~193~~
2% fat milk, 1 cup				1		5		122
DINNER								
* Lentil stroganoff, 1 serving noodles lentils vegetables, cut yogurt	1-1/2 1-1/4			1/4	2	5		520
Cooked whole green beans, 1 cup with soft margarine, 1 teaspoon		2				trace 4		43 34
Tomato and cucumber salad Tomato, cucumber, lettuce leaf	1					trace		17
Reduced-calorie vinaigrette dressing, 1 tablespoon						1		16
Small pumpernickel rolls, 2	2					2		155
Soft margarine, 2 teaspoons						8		68
Medium honeydew melon, 1/4			2			trace		88
Add→ Skim chocolate milk, 1 cup				1		.2	.1	139
SNACKS								
No-salt added vegetable juice, 3/4 cup		1				trace		34
* Roast beef sandwich roast beef whole-wheat bread lettuce leaf mustard, 1 teaspoon	2				2	5		227
2% fat milk, 1 cup				1		5		122
Lemonade, 1 cup						**trace**		**100**
TOTAL	~~11 1/4~~ **10-1/2**	6-1/4	4	~~3 1/4~~ **4-1/4**	7	~~91~~ **73.2**	~~28~~ **22.3**	~~2,794~~ **2,740**

*From: Using the Food Guide Pyramid: A Resource for Nutrition Educators. U.S. Department of Agriculture: Food, Nutrition, and Consumer Services, Center for Nutrition Policy and Promotion.

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Table 6e
Adding One Additional Dairy Serving Food Guide Pyramid Menu Example (2,800 calories)

FOOD GUIDE PYRAMID 2,800 CALORIE MENU, DAY 5*								
Item	Bread	Vegetable	Fruit	Milk	Meat Oz.	Fat Grams	Saturated Fat Grams	Calories
BREAKFAST								
Medium cantaloupe, 1/4			1			trace		48
* Whole-wheat pancakes, 3	3					6		257
* Blueberry sauce, 6 tablespoons			1/2			trace		50
Soft margarine, 2 teaspoon						8		68
Turkey patty, 1 serving					1-1/2	6		123
2% fat milk, 1 cup				1		5		122
LUNCH								
* Chili-stuffed baked potato medium potato tomato sauce beef and beans		1 1/2			2-1/2	9		397
Low-fat, low-sodium cheddar cheese 3 tablespoons				1/3		1		36
* Spinach-orange salad, 1 cup spinach chopped vegetables orange sections and juice		1 1/2	1/2			7		108
Wheat crackers, 6	1					4		86
Fig bars, 2	1					2		115
2% fat milk, 1 cup				1		5	.1	122
DINNER								
* Apricot-glazed chicken, 1 serving chicken apricots, raisins, and orange juice			1/2		3	2		212
*Rice-pasta pilaf, 3/4 cup	1-1/2	1/4				5		203
Tossed salad, 1 cup		1				trace		13
Reduced-calorie Italian dressing, 1 tablespoon						1		16
Small hard roll, 2	2					2		156
Soft margarine, 2 teaspoons						8		68
Vanilla ice milk, 1/2 cup				1/3		3		91
SNACKS								
Remove→ ~~Large soft pretzel~~	~~2 1/2~~					~~2~~	~~0.4~~	~~190~~
Medium apple, 1/2			1/2			trace		41
Lemonade, 1 cup						trace		100
Add→ **2% fat milk, 1 cup**				1		5		122
Non-fat yogurt, 1 cup				1		.2	.1	98
TOTAL	~~11~~ 8-1/2	5-1/4	4	~~3-2/3~~ 4-2/3	7	~~87~~ 85.2	~~27~~ 26.7	~~2,860~~ 2,755

*From: Using the Food Guide Pyramid: A Resource for Nutrition Educators. U.S. Department of Agriculture: Food, Nutrition, and Consumer Services, Center for Nutrition Policy and Promotion.

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TABLE 7.

IMPACT OF MEETING FOOD GUIDE PYRAMID DAIRY RECOMMENDATION ON CALCIUM INTAKE – CSFII 1994-96, 1998

	Total for Age Group	FGP Dairy Recommendations[1] Met	FGP Dairy Recommendations[1] Not Met	Percentage Meeting FGP Dairy Recommendation
CHILDREN 2-8 YEARS				
Calcium, mg/day[2]	849.9 (8.4)	1144.8 (7.8)	607.3 (4.3)	
Calcium, % meeting AI	60.8	97.4	30.8	
Number of subjects	6574	2928	3646	44.5
Dairy consumption, servings/day[2]	2.00 (0.02)	2.95 (0.02)	1.22 (0.01)	
CHILDREN 9-18 YEARS				
Calcium, mg/day	984.7 (13.5)	1665.1 (28.0)	748.1 (8.5)	
Calcium, % meeting AI	18.4	79.1	2.9	
Number of subjects	2931	989	1842	13.2
Dairy consumption, servings/day	2.01 (0.04)	4.19 (0.08)	1.45 (0.02)	
ADULTS 19-50 YEARS				
Calcium, mg/day	787.3 (12.9)	1420.2 (38.4)	596.4 (5.0)	
Calcium, % meeting AI	29.8	83.1	6.0	
Number of subjects	4913	1124	3789	22.9
Dairy consumption, servings/day	1.41 (0.03)	3.20 (0.06)	0.87 (0.01)	
ADULTS 51+ YEARS				
Calcium, mg/day	874.0 (8.0)	1566.9 (28.1)	627.9 (5.1)	
Calcium, % meeting AI	8.0	90.9	3.7	
Number of subjects	2442	235	4207	5.3
Dairy consumption, servings/day	1.18 (0.02)	3.87 (0.07)	1.02 (0.01)	

[1] Food Guide Pyramid recommends 2 servings of dairy products per day for those 8 years and younger, 3 servings/day for those 9-18 years, 2 servings/day for those 19-50 years and 3 servings/day for those greater than 50 years

[2]Mean (SEM)

TABLE 8. IMPACT OF VARIOUS LEVELS OF DAIRY CONSUMPTION ON CALCIUM INTAKE -- CSFII 1994-96, 1998

	NUMBER OF DAIRY SERVINGS CONSUMED PER DAY					
	> 1	1 to 1.5	1.5 to 2.5	2.5 to 3.5	3.5 to 4.5	> 4.5
CHILDREN 2-8 YEARS						
Calcium, mg/day[1]	415.3 (5.8)	617.8 (4.5)	835.4 (3.9)	1138.1 (6.2)	1466.3 (10.0)	1932.4 (43.5)
Calcium, % meeting AI	6.2	29.2	72.1	100.0	100.0	100.0
Number of subjects	1118	1244	2386	1228	429	169
Dairy consumption, servings/day[1]	0.59 (0.01)	1.26 (0.01)	1.96 (0.01)	2.93 (0.01)	3.92 (0.02)	5.47 (0.12)
CHILDREN 9-18 YEARS						
Calcium, mg/day (SEM)	436.6 (7.5)	680.4 (7.8)	915.1 (7.9)	1261.1 (11.9)	1539.7 (17.5)	2227.4 (50.1)
Calcium, % meeting AI	0.0	0.0	1.9	33.5	53.0	100.0
Number of subjects	495	366	591	349	138	100
Dairy consumption, servings/day	0.62 (0.01)	1.25 (0.01)	1.96 (0.01)	2.96 (0.02)	3.97 (0.03)	5.80 (0.14)
ADULTS 19-50 YEARS						
Calcium, mg/day (SEM)	458.2 (4.7)	727 (6.5)	964.8 (6.8)	1323.3 (12.8)	1579.5 (25.6)	2568.2 (164.6)
Calcium, % meeting AI	0.4	5.7	39.1	95.4	100.0	100.0
Number of subjects	2287	905	1025	417	165	114
Dairy consumption, servings/day	0.48 (0.01)	1.23 (0.01)	1.93 (0.01)	2.94 (0.02)	3.97 (0.03)	6.17 (0.15)
ADULTS 51+ YEARS						
Calcium, mg/day (SEM)	439.8 (4.1)	698.9 (6.1)	929.3 (6.8)	1241.3 (13.4)	1598.4 (24.9)	2100.7 (70.8)
Calcium, % meeting AI	0.3	1.3	7.0	53.0	100.0	100.0
Number of subjects	2310	837	684	271	97	43
Dairy consumption, servings/day	0.46 (0.01)	1.23 (0.01)	1.92 (0.02)	2.89 (0.02)	3.89 (0.03)	5.60 (0.21)

[1]Mean (SEM)

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TABLE 9. IMPACT OF VARIOUS LEVELS OF DAIRY CONSUMPTION ON CALCIUM INTAKE -- NHANES 1999-2000

	NUMBER OF DAIRY SERVINGS CONSUMED PER DAY					
	< 1	1 to 1.5	1.5 to 2.5	2.5 to 3.5	3.5 to 4.5	> 4.5
CHILDREN 2-8 YEARS						
Calcium, mg/day[1]	408.8 (14.9)	610.2 (11.1)	821.7 (10.8)	1121.7 (24.3)	1401.2 (22.0)	2002.1 (68.8)
Calcium, % meeting AI	8.7	24.8	68.3	99.1	100.0	100.0
Number of subjects	285	181	327	180	96	74
Dairy consumption, servings/day[1]	0.48 (0.06)	1.23 (0.01)	1.94 (0.02)	2.86 (0.03)	3.90 (0.08)	5.88 (0.31)
CHILDREN 9-18 YEARS						
Calcium, mg/day	382.3 (10.0)	652 (13.0)	900.7 (13.8)	1223.5 (16.3)	1517.7 (21.7)	2257.1 (80.8)
Calcium, % meeting AI	0.0	0.6	5.0	35.6	85.9	100.0
Number of subjects	839	399	514	349	163	157
Dairy consumption, servings/day	0.49 (0.02)	1.22 (0.01)	1.97 (0.02)	2.95 (0.03)	3.97 (0.04)	6.14 (0.20)
ADULTS 19-50 YEARS						
Calcium, mg/day	423.4 (8.0)	728.1 (15.6)	955.8 (13.5)	1308.4 (20.3)	1604.2 (40.0)	2438.2 (123.3)
Calcium, % meeting AI	2.0	11.2	35.6	93.2	95.3	100.0
Number of subjects	1086	361	454	269	141	639
Dairy consumption, servings/day	0.38 (0.01)	1.23 (0.01)	1.94 (0.02)	2.98 (0.02)	3.99 (0.03)	6.39 (0.21)
ADULTS 51+ YEARS						
Calcium, mg/day	422.4 (9.3)	694.2 (13.4)	910.6 (13.9)	1217.1 (21.5)	1421.8 (37.3)	2106.2 (107.6)
Calcium, % meeting AI	0.6	1.8	8.5	53.2	85.3	100.0
Number of subjects	986	385	368	179	82	66
Dairy consumption, servings/day	0.38 (0.01)	1.24 (0.01)	1.92 (0.02)	2.93 (0.03)	3.87 (0.04)	6.01 (0.32)

[1]Mean (SEM)

TABLE 10.

Composite Calcium Content of Marketplace Dairy Products

Marketplace Servings	Calcium mg/serving
Milk, 1 cup	300
Yogurt, 8 oz	300
Yogurt, 6 oz	200
Cheese, natural - 1 oz	200
Cheese, proc. - 3/4 oz	129
Composite[1,2]	247

Note: From USDA ERS, US consumption of dairy products is 44.4% from milk, 34.7% from cheese and 20.8% from other dairy products including yogurt

[1]Assumes 55% yogurt consumption is 8 ozs and 45% of yogurt consumption is 6 oz; assumes cheese consumption split 62.3 % natural cheese

[2]For children 2-6 the composite is 170 mg/serving, which represents 1/3 servings except milk

TABLE 11.

Calcium Provided by Food Guide Pyramid Patterns with Marketplace Based Dairy Servings[1]

Ages	Calcium DRI, mg/d	Mean Calories/d[2]	Percent Pattern A[3]	Child 2-6 years (2 dairy)	Percentage of DRI								
					Pattern A			Pattern B			Pattern C		
					(2 dairy)	(3 dairy)	(4 dairy)	(2 dairy)	(3 dairy)	(4 dairy)	(2 dairy)	(3 dairy)	(4 dairy)
1-3 years	500	1548	77.0	**97**									
4-8 years	800	1845	59.7	**79**	**98**	129	159	116	147	178	129	160	191
9-13 years	1300	2107	47.8		**60**	**79**	98	**72**	**91**	110	**80**	**99**	**118**
Females													
14-18 years	1300	1958	50.8		**60**	**79**	98	**72**	**91**	110	**80**	**99**	118
19-30 years	1000	2040	51.2		**78**	103	128	**93**	118	143	104	128	153
31-50 years	1000	1939	54.5		**78**	103	128	**93**	118	143	104	128	153
51-70 years	1200	1697	68.5		**65**	**86**	106	**78**	**98**	119	**86**	107	127
>70 years	1200	1440	80.6		**65**	**86**	106	**78**	**98**	119	**86**	107	127
Males													
14-18 years	1300	2806	24.6					**72**	**91**	110	**80**	**99**	118
19-30 years	1000	2867	22.8					**93**	118	143	104	128	153
31-50 years	1000	2713	22.9					**93**	118	143	104	128	153
51-70 years	1200	2354	33.0		**65**	**86**	106	**78**	**98**	119	**86**	107	127
>70 years	1200	1930	50.3		**65**	**86**	106	**78**	**98**	119	**86**	107	127

[1] 72% of calcium comes from dairy sources; 32% from milk, 25% from cheese and 15% from other dairy products including yogurt (ERS, 1999). Non-dairy calcium intake calculated from food patterns and calcium composites from Shaw, et al., 2000 -- Pattern A: 287 mg/d; Pattern B : 437 mg/day and Pattern C: 541mg/d. Marketplace dairy serving composite was 256 mg/d.

[2]Calories from NHANES IV.

[3]Pattern A defined as less than 1900 kcal/day in NHANES IV; the midpoint between Pattern A and B.

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TABLE 12.

Calcium Provided by Non-dairy plus Marketplace Based Dairy Servings[1]

Ages	Calcium DRI mg/day	Non-Dairy Calcium, mg/day[2]	Percentage of DRI (2 dairy)	(3 dairy)	(4 dairy)
Females					
1-3 years	500	191.6	106	140	174
4-8 years	800	226.3	90	121	152
9-13 years	1300	273.5	**59**	**78**	**97**
14-18 years	1300	273.9	**59**	**78**	**97**
19-30 years	1000	296.2	**79**	104	128
31-50 years	1000	312.5	**81**	105	130
51-70 years	1200	283.5	**65**	**85**	106
>70 years	1200	238.7	**61**	**82**	102
Males					
1-3 years	500	216.7	111	145	179
4-8 years	800	286.1	**98**	128	159
9-13 years	1300	283.6	**60**	**79**	**98**
14-18 years	1300	381.9	**67**	**86**	105
19-30 years	1000	404.7	**90**	115	139
31-50 years	1000	423.5	**92**	116	141
51-70 years	1200	377.2	**73**	**93**	114
>70 years	1200	312.3	**67**	**88**	108

[1]Marketplace dairy serving defined as 256 mg/serving.

[2]Non-dairy calcium intake calculated from NHANES IV.

FIGURE 1.

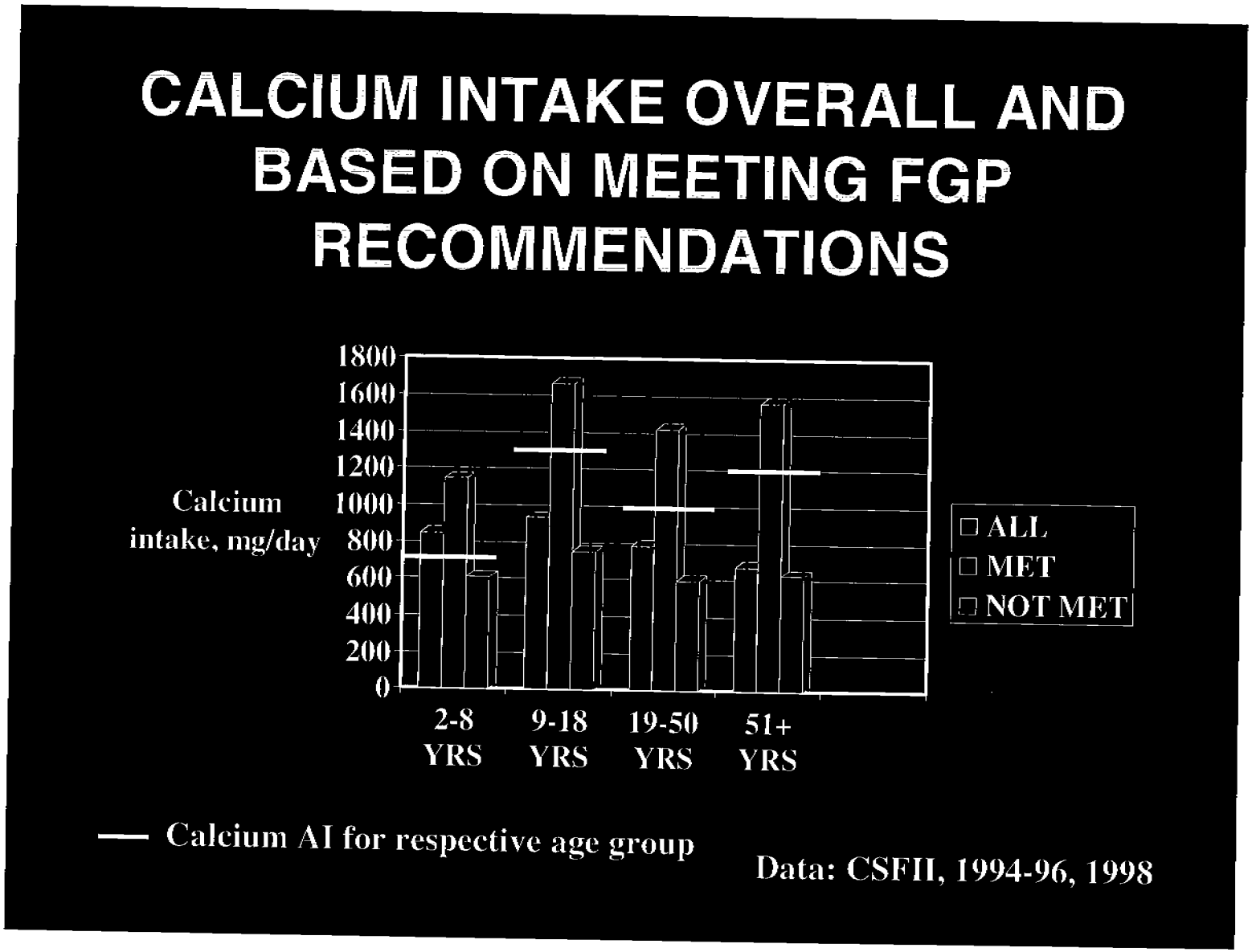
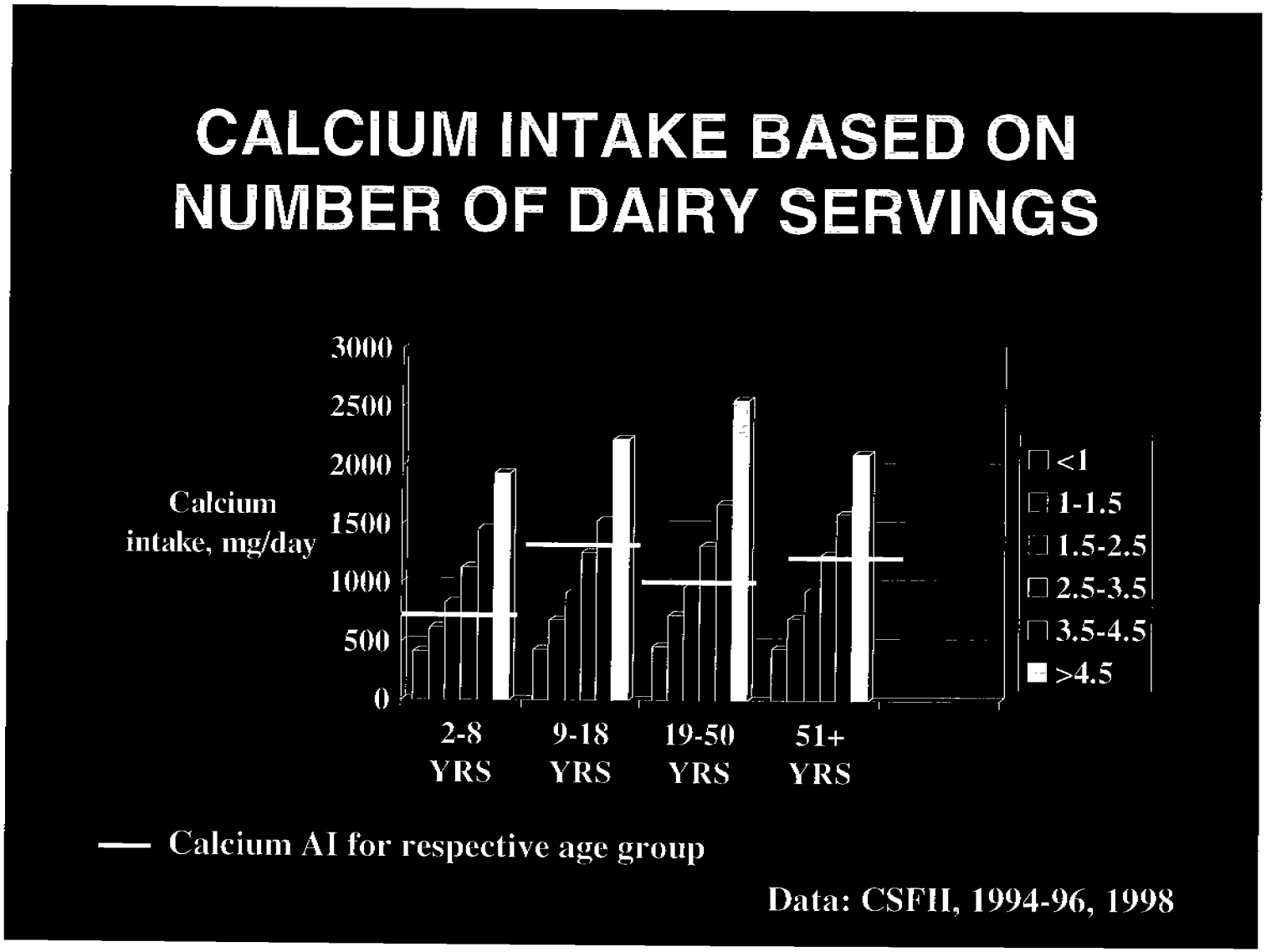

CALCIUM INTAKE OVERALL AND BASED ON MEETING FGP RECOMMENDATIONS
Calcium intake, mg/day
1800
1600
1400
1200
1000
800
600
400
200
0
2-8 YRS
9-18 YRS
19-50 YRS
51+ YRS
ALL
MET
NOT MET
Calcium AI for respective age group
Data: CSFII, 1994-96, 1998

FIGURE 2.


CALCIUM INTAKE BASED ON NUMBER OF DAIRY SERVINGS
Calcium intake, mg/day
3000
2500
2000
1500
1000
500
0
2-8 YRS
9-18 YRS
19-50 YRS
51+ YRS
<1
1-1.5
1.5-2.5
2.5-3.5
3.5-4.5
>4.5
Calcium AI for respective age group
Data: CSFII, 1994-96, 1998